May 26, 2016

Director Scott Glenn
Office of Environmental Quality Control
Department of Health, State of Hawai‘i
235 S. Beretania Street, Room 702
Honolulu, Hawai‘i 96813

Subject: Hawai‘i Dairy Farms Draft EIS
TMK: (4) 2-9-003: 001 portion and 006 portion and (4) 2-9-001: 001 portion
Kōloa District, Kaua‘i

Dear Director Glenn:

On behalf of Hawai‘i Dairy Farms, Group 70 International hereby transmits the documents package for the Draft Environmental Impact Statement for publication of a notice of availability in the Environmental Notice. The Draft EIS has included copies of all written comments received during the early consultation period and during the 30-day public consultation period for the EISP.

Also enclosed is a distribution list for the verification of OEQC under Section 11-200-20, Hawai‘i Administrative Rules. Upon receiving verification from OEQC (along with the bulletin proof of the notice containing the pertinent details for commenters), we will make the Draft EIS and the bulletin proof available to those so indicated on the distribution list, so they will have the full 45-day statutory period to review and provide comment.

Finally, enclosed is a completed OEQC Publication Form, four copies of the draft EIS, an Adobe Acrobat PDF file of the same, and an electronic copy of the publication form in MS Word. Simultaneous with this letter, we have submitted the summary of the action in a text file by electronic mail to the OEQC.

If there are any questions, please contact me at (808) 523-5866.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

cc: Hawai‘i Dairy Farms
Hawai‘i State Department of Health,
Environmental Planning Office
## Project Name:
Hawai‘i Dairy Farms

## Project Short Name:
(please use no more than five succinct words; count not to include document status, e.g., EA)

## HRS §343-5 Trigger(s):
To be determined

## Island(s):
Kaua‘i

## Judicial District(s):
Po‘ipu

## TMK(s):
(4) 2-9-003:001 (portion); 006 (portion); (4) 2-9-001:001 (portion)

## Permit(s)/Approval(s):
USDA NRCS Conservation Plan; DOH National Pollutant Discharge Elimination System Construction Stormwater General Permit; DOH Review of Animal Feeding Operation/Large Concentrated Animal Feeding Operation; DLNR Chapter 6E-42 Historic Preservation Review; County of Kaua‘i Building Permit

## Approving Agency:
State of Hawai‘i, Department of Health
Virginia Pressler, M.D., Director

### Contact Name, Email, Telephone, Address
Laura McIntyre, Environmental Planning Office
Doh.epo@doh.hawaii.gov
(808) 586-4337
1250 Punchbowl Street, Honolulu, HI 96813

### Applicant:
Hawai‘i Dairy Farms, LLC.

### Contact Name, Email, Telephone, Address
Amy Hennessey
info@hawaiidairylfarms.com
P.O. Box 1690
Koloa, Hawai‘i 96756-1690
(808) 544-8968

## Consultant:
Group 70 International, Inc.

### Contact Name, Email, Telephone, Address
Jeff Overton, Principal Planner
HDF@Group70Int.com
(808) 523-5866
925 Bethel Street, 5th Floor, Honolulu, HI 96813

### Status (select one)

#### DEA-AFNSI
Submit 1) the approving agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEA, and 4) a searchable PDF of the DEA; a 30-day comment period follows from the date of publication in the Notice.

#### FEA-FONSI
Submit 1) the approving agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; no comment period follows from publication in the Notice.

#### FEA-EISPN
Submit 1) the approving agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; a 30-day comment period follows from the date of publication in the Notice.

#### Act 172-12 EISPN
(“Direct to EIS”)
Submit 1) the approving agency notice of determination letter on agency letterhead and 2) this completed OEQC publication form as a Word file; no EA is required and a 30-day comment period follows from the date of publication in the Notice.

#### DEIS
Submit 1) a transmittal letter to the OEQC and to the approving agency, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEIS, 4) a searchable PDF of the DEIS, and 5) a searchable PDF of the distribution list; a 45-day comment period follows from the date of publication in the Notice.

#### FEIS
Submit 1) a transmittal letter to the OEQC and to the approving agency, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEIS, 4) a searchable PDF of the FEIS, and 5) a searchable PDF of the distribution list; no comment period follows from publication in the Notice.
The approving agency simultaneously transmits to both the OEQC and the applicant a letter of its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS; no comment period ensues upon publication in the Notice.

The approving agency simultaneously transmits to both the OEQC and the applicant a notice that it did not make a timely determination on the acceptance or nonacceptance of the applicant's FEIS under Section 343-5(c), HRS, and therefore the applicant's FEIS is deemed accepted as a matter of law.

The approving agency simultaneously transmits its notice to both the applicant and the OEQC that it has reviewed (pursuant to Section 11-200-27, HAR) the previously accepted FEIS and determines that a supplemental EIS is or is not required; no EA is required and no comment period ensues upon publication in the Notice.

Identify the specific document(s) to withdraw and explain in the project summary section.

Contact the OEQC if your action is not one of the above items.

---

**Project Summary**

Provide a description of the proposed action and purpose and need in 200 words or less.

HDF will establish and operate a sustainable, rotational-grazing pasture system dairy farm on 557-acres in Māhā'ulepū Valley on the island of Kauaʻi to produce fresh, locally available nutritious milk for Hawaiʻi families. The rotational-grazing method utilizes 100 percent of the cows' manure as fertilizer for pasture grass to provide the primary source of nutrients. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will provide a local food source appropriate for cow health and quality milk production, and will comprise at least 70 percent of the animals' diet. HDF has committed to establish a herd of up to 699 mature milking cows, producing approximately one million gallons of fresh milk annually. HDF may contemplate possible expansion of the herd up to 2,000 mature milking cows.
This environmental document is prepared pursuant to Hawai‘i Revised Statutes, Chapter 343, Environmental Impact Statement Law and Chapter 200 of Title 11, Administrative Rules, Department of Health, Environmental Impact Statement Rules.

MAY 2016
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Jeffrey H. Overton, AICP, LEED AP

Date

MAY 2016
# VOLUME 1 - TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>SECTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table of Contents</td>
<td>i</td>
</tr>
<tr>
<td>List of Figures</td>
<td>v</td>
</tr>
<tr>
<td>List of Tables</td>
<td>vi</td>
</tr>
<tr>
<td>List of Technical Appendices</td>
<td>vii</td>
</tr>
<tr>
<td>Abbreviations and Acronyms</td>
<td>ix</td>
</tr>
</tbody>
</table>

## 1.0 PROJECT SUMMARY

1.1 Project Information Summary | 1-1 |
1.2 Proposed Project | 1-3 |
1.3 Environmental Review Under Chapter 343, Hawai‘i Revised Statutes | 1-12 |
1.4 Significant Beneficial and Adverse Impacts and Proposed Mitigation Measures | 1-13 |
1.4.1 Beneficial Impacts | 1-13 |
1.4.2 Adverse Impacts | 1-14 |
1.4.3 Proposed Mitigation Measures | 1-14 |
1.5 Unresolved Issues | 1-16 |
1.6 Summary of Compatibility with Land Use Policies and Plans | 1-16 |
1.7 Summary of Alternatives Considered to the Proposed Action | 1-17 |
1.7.1 No-Action Alternative | 1-17 |
1.7.2 Conventional Feedlot Dairy | 1-18 |
1.7.3 Pasture-Based Dairy and Off-Site Processing | 1-18 |
1.8 Listing of Required Government Permits and Approvals | 1-20 |

## 2.0 PURPOSE AND NEED OF THE PROPOSED PROJECT

2.1 Introduction and Background | 2-1 |
2.2 History of the Dairy Industry in Hawai‘i | 2-3 |
2.2.1 The Dairy Market in Hawai‘i | 2-3 |
2.2.2 Important Agricultural Lands | 2-5 |
2.3 Purpose and Need for the Hawai‘i Dairy Farms Project | 2-7 |
2.3.1 Project Purpose | 2-7 |
2.3.2 Project Need | 2-7 |
2.3.3 Project Objectives | 2-7 |
2.3.4 Evaluation Criteria | 2-8 |
2.4 Planned Dairy Development on Māhā‘ulepū Agricultural Lands | 2-8 |

## 3.0 DESCRIPTION OF THE PROPOSED ACTION

3.1 Site Description: History and Vision | 3-2 |
3.2 Conservation Practices | 3-6 |
3.3 Dairy Site Requirements and Layout | 3-7 |
3.3.1 Buildings | 3-9 |
3.3.2 Agricultural Infrastructure | 3-13 |
3.4 Herd Management | 3-18 |
4.0 ENVIRONMENTAL SETTING, POTENTIAL IMPACTS, AND MITIGATION MEASURES

4.1 Climate ......................................................................................................................... 4-3
  4.1.1 Existing Conditions ................................................................................................. 4-3
  4.1.2 Probable Impacts and Mitigation Measures ......................................................... 4-5

4.2 Topography .................................................................................................................... 4-6
  4.2.1 Existing Conditions ............................................................................................... 4-6
  4.2.2 Probable Impacts and Mitigation Measures ......................................................... 4-6

4.3 Soils .................................................................................................................................. 4-7
  4.3.1 Existing Conditions ............................................................................................... 4-7
  4.3.2 Probable Impacts and Mitigation Measures ......................................................... 4-11

4.4 Land Use and Agricultural Setting .............................................................................. 4-14
  4.4.1 Existing Conditions ............................................................................................... 4-14
  4.4.2 Probable Impacts and Mitigation Measures ......................................................... 4-16

4.5 Visual and Aesthetic Resources .................................................................................. 4-18
  4.5.1 Existing Conditions ............................................................................................... 4-18
  4.5.2 Probable Impacts and Mitigation Measures ......................................................... 4-19

4.6 Natural Hazards ............................................................................................................ 4-21
  4.6.1 Existing Conditions ............................................................................................... 4-21
  4.6.2 Probable Impacts and Mitigation Measures ......................................................... 4-24

4.7 Archaeological and Historic Resources ...................................................................... 4-25
  4.7.1 Existing Conditions ............................................................................................... 4-26
  4.7.2 Probable Impacts and Mitigation Measures ......................................................... 4-29

4.8 Cultural Practices and Resources ................................................................................ 4-31
  4.8.1 Existing Conditions ............................................................................................... 4-31
  4.8.2 Probable Impacts and Mitigation Measures ......................................................... 4-33

4.9 Flora ............................................................................................................................... 4-33
  4.9.1 Existing Conditions ............................................................................................... 4-33
  4.9.2 Probable Impacts and Mitigation Measures ......................................................... 4-35

4.10 Fauna ............................................................................................................................ 4-35
  4.10.1 Existing Conditions .............................................................................................. 4-35
  4.10.2 Probable Impacts and Mitigation Measures ......................................................... 4-36

4.11 Invertebrate Species and Pest Insects ....................................................................... 4-39
  4.11.1 Existing Conditions .............................................................................................. 4-39
4.11.2 Probable Impacts and Mitigation Measures ................................................. 4-40
4.12 Noise ........................................................................................................ 4-43
4.12.1 Existing Conditions ................................................................................. 4-43
4.12.2 Probable Impacts and Mitigation Measures ............................................. 4-43
4.13 Hazardous Substances .................................................................................. 4-44
4.13.1 Existing Conditions .................................................................................. 4-44
4.13.2 Probable Impacts and Mitigation Measures ............................................. 4-45
4.14 Public Services ............................................................................................... 4-46
4.14.1 Fire Department ........................................................................................ 4-46
4.14.2 Medical ...................................................................................................... 4-46
4.14.3 Police ......................................................................................................... 4-46
4.14.4 Educational Facilities ............................................................................... 4-46
4.14.5 Libraries ..................................................................................................... 4-47
4.15 Demographic and Economic Conditions .............................................................. 4-47
4.15.1 Existing Conditions ................................................................................ 4-47
4.15.2 Probable Impacts and Mitigation Measures ............................................. 4-49
4.16 Groundwater Resources .................................................................................... 4-51
4.16.1 Hydrology .................................................................................................. 4-52
4.16.2 Potable Water ........................................................................................... 4-54
4.16.3 Probable Impacts and Mitigation Measures ............................................. 4-58
4.17 Surface Water Resources & Nearshore Marine Environment ......................... 4-60
4.17.1 Intermittent Streams and Agricultural Ditches of Māhā'ulepū Valley .... 4-60
4.17.2 Surface Water Quality .............................................................................. 4-61
4.17.3 Nearshore Marine Waters ........................................................................ 4-63
4.17.4 Probable Impacts and Mitigation Measures ............................................. 4-65
4.18 Roadways and Traffic ..................................................................................... 4-68
4.18.1 Existing Conditions ................................................................................ 4-69
4.18.2 Probable Impacts and Mitigation Measures ............................................. 4-69
4.19 Air Quality, Odor, and Greenhouse Gases ...................................................... 4-71
4.19.1 Air Quality ................................................................................................. 4-71
4.19.2 Odor Assessment ...................................................................................... 4-73
4.19.3 Greenhouse Gases ................................................................................... 4-76
4.20 Summary of Probable Impacts and Contextual Issues .................................... 4-78
4.20.1 Interrelationships and Cumulative Environmental Impacts ...................... 4-78
4.20.2 Potential Secondary Effect ......................................................................... 4-85
4.20.3 Relationship between Local Short-term Uses of the Environment and the Maintenance and Enhancement of Long-term Productivity 4-86
4.20.4 Irreversible and Irretrievable Commitments of Resources ......................... 4-86
4.20.5 Potential for Environmental Accidents ...................................................... 4-87
4.20.6 Adverse Environmental Effects that Cannot Be Avoided .......................... 4-87
4.21 Demographic and Economic Conditions (Contemplated Herd Size) ............ 4-88
4.21.1 Existing Conditions ................................................................................ 4-88
4.22 Groundwater Resources (Contemplated Herd Size) ....................................... 4-88
4.22.1 Existing Conditions ................................................................................ 4-88
4.22.2 Probable Impact and Mitigation Measures .............................................. 4-88
4.23 Surface Water Resources (Contemplated Herd Size) ..................................... 4-89
4.23.1 Existing Conditions ................................................................................ 4-89
4.23.2 Probable Impact and Mitigation Measures ............................................... 4-90
4.24 Roadways and Traffic (Contemplated Herd Size) .......................................... 4-91
5.0 CONSISTENCY WITH GOVERNMENT PLANS AND POLICIES

5.1 Coastal Zone Management Act ................................................................. 5-2
5.2 Hawai‘i State Constitution ...................................................................... 5-3
5.2.1 Act 183 (SLH) Relating to Important Agricultural Lands ................. 5-3
5.3 Hawai‘i State Plan ...................................................................................... 5-5
5.4 Hawai‘i State Functional Plan ................................................................. 5-23
5.5 Hawai‘i 2050 Sustainability Plan .............................................................. 5-24
5.6 Hawai‘i State Land Use District Boundaries ............................................ 5-27
5.7 State of Hawai‘i Department of Agriculture ............................................ 5-28
5.8 State of Hawai‘i Water Policies ............................................................... 5-28
5.9 Hawai‘i Coastal Zone Management Program ......................................... 5-30
5.10 County of Kaua‘i General Plan ................................................................. 5-32
5.11 County of Kaua‘i Comprehensive Zoning Ordinance .......................... 5-42
5.12 County of Kaua‘i - Special Management Area ..................................... 5-43
5.13 County of Kaua‘i - South Kaua‘i Community Plan ............................... 5-45

6.0 ALTERNATIVES TO THE PROPOSED ACTION

6.1 Alternatives Analysis Overview ............................................................... 6-1
6.2 Alternatives Considered and Eliminated ................................................ 6-2
6.2.1 Non-viable Alternatives ...................................................................... 6-2
6.2.2 Agricultural Park and Processing Center Alternatives ........................ 6-3
6.2.3 Agricultural Subdivision ...................................................................... 6-5
6.3 No Action Alternative ............................................................................. 6-8
6.4 Conventional Feedlot Dairy Alternatives .............................................. 6-8
6.5 Alternative Location for the Pasture-Based Dairy .................................. 6-12
6.6 Milk Products Processing by HDF ......................................................... 6-15
6.7 Summary Comparison of Alternatives ................................................... 6-16
7.0 AGENCIES AND PARTIES CONSULTED

7.1 Agencies and Parties Consulted............................................................................................................... 7-1

7.2 Comments and Responses to the EISPN ............................................................................................ 7-12

See Volumes 3 and 4 of the DEIS for Comment Letters and Responses

8.0 LIST OF REFERENCES AND EIS PREPARERS

8.1 References .................................................................................................................................................. 8-1

8.2 Preparers of the EIS................................................................................................................................... 8-7

LIST OF FIGURES

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2-1</td>
<td>Island Location Map ................................................................. 1-5</td>
</tr>
<tr>
<td>1.2-2</td>
<td>Project Area Map .............................................................................. 1-6</td>
</tr>
<tr>
<td>2.1-1</td>
<td>County and State Plans Supportive of Agricultural Self-Sufficiency ......................................................... 2-2</td>
</tr>
<tr>
<td>2.1-2</td>
<td>State Land Use Districts and Important Agricultural Lands on Kaua‘i .......................................................... 2-6</td>
</tr>
<tr>
<td>2.4-1</td>
<td>Project Location on Māhāʻulepū Agricultural Lands .................................................................................. 2-10</td>
</tr>
<tr>
<td>3.1-1</td>
<td>Project Area .......................................................................................... 3-3</td>
</tr>
<tr>
<td>3.1-2</td>
<td>Tax Map Key for Project Area ............................................................... 3-4</td>
</tr>
<tr>
<td>3.1-3</td>
<td>Kōloa Plantation Sugarcane Lands in 1935 ............................................................................................... 3-5</td>
</tr>
<tr>
<td>3.3-1</td>
<td>Dairy Facilities Site Plan ................................................................. 3-8</td>
</tr>
<tr>
<td>3.3-2</td>
<td>Milking Parlor .................................................................................... 3-10</td>
</tr>
<tr>
<td>3.3-3</td>
<td>Calving Sheds ..................................................................................... 3-10</td>
</tr>
<tr>
<td>3.3-4</td>
<td>Dairy Facility Detail ........................................................................... 3-11</td>
</tr>
<tr>
<td>3.3-5</td>
<td>Effluent Pond Siting ........................................................................ 3-15</td>
</tr>
<tr>
<td>3.3-6</td>
<td>Effluent Pond Plan and Section for Committed Herd of 699 Mature Dairy Cows ........................................ 3-17</td>
</tr>
<tr>
<td>3.5-1</td>
<td>Dairy facility Site Plan ................................................................. 3-20</td>
</tr>
<tr>
<td>3.5-2</td>
<td>Kikuyu Grass .................................................................................... 3-22</td>
</tr>
<tr>
<td>3.5-3</td>
<td>Paddock Layout ................................................................................ 3-23</td>
</tr>
<tr>
<td>3.5-4</td>
<td>Components of the Central Pivot Irrigation System .............................................................................. 3-26</td>
</tr>
<tr>
<td>3.5-5</td>
<td>Irrigated Pasture Area .................................................................... 3-27</td>
</tr>
<tr>
<td>3.8-1</td>
<td>Effluent Pond Plan and Section for Contemplated Herd of up to 2,000 Mature Dairy Cows ...................... 3-34</td>
</tr>
<tr>
<td>4.1-1</td>
<td>Wind Direction and Wind Speed for Māhāʻulepū Valley ........................................................... 4-3</td>
</tr>
<tr>
<td>4.3-1</td>
<td>Soils Characterization at HDF ............................................................ 4-9</td>
</tr>
<tr>
<td>4.3-2</td>
<td>Soil Hydraulic Conductivity .............................................................. 4-12</td>
</tr>
<tr>
<td>4.4-1</td>
<td>South Kaua‘i Community Plan Use Map ............................................. 4-15</td>
</tr>
<tr>
<td>4.4-2</td>
<td>Important Agricultural Lands in Region ........................................... 4-17</td>
</tr>
<tr>
<td>4.4-3</td>
<td>Dairy Distances from Development ..................................................... 4-18</td>
</tr>
<tr>
<td>4.5-1</td>
<td>Hawai‘i Dairy Farms Site in Māhāʻulepū Valley, Kaua‘i ................................................................. 4-19</td>
</tr>
<tr>
<td>4.5-2</td>
<td>Views of Māhāʻulepū Valley and the Dairy Property ........................................................................... 4-20</td>
</tr>
<tr>
<td>4.5-3</td>
<td>View Key Map .................................................................................. 4-21</td>
</tr>
<tr>
<td>4.6-1</td>
<td>Hazard Rating for Po‘ipū Coast ............................................................. 4-23</td>
</tr>
<tr>
<td>4.6-2</td>
<td>Tsunami Evacuation Zone in Po‘ipū ......................................................... 4-24</td>
</tr>
</tbody>
</table>
LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>Land Use Summary ................................................................. 1-7</td>
</tr>
<tr>
<td>1-2</td>
<td>Nutrient Mass Balance for Committed Herd Size up to 699 Mature Dairy Cows / Nutrient Mass Balance for Contemplated Herd Size up to 2,000 Mature Dairy Cows ............. 1-11</td>
</tr>
<tr>
<td>1-3</td>
<td>State and County Land Use Permits and Approvals .......................... 1-11</td>
</tr>
<tr>
<td>3-2-1</td>
<td>NRCS Conservation Practices to be Utilized at HDF .......................... 3-7</td>
</tr>
<tr>
<td>3-3-1</td>
<td>Land Use Summary ....................................................................... 3-9</td>
</tr>
<tr>
<td>3-3-2</td>
<td>Effluent Pond Sizing Criteria for Committed Herd Size up to 699 Mature Dairy Cows .......... 3-16</td>
</tr>
<tr>
<td>3-4-1</td>
<td>Nutrient Mass Balance for Committed Herd Size up to 699 Mature Dairy Cows ............. 3-16</td>
</tr>
<tr>
<td>3-8-1</td>
<td>Effluent Pond Sizing Criteria for Contemplated Future Possible Herd up to 2,000 Mature Dairy Cows ................................................. 3-33</td>
</tr>
<tr>
<td>3-8-2</td>
<td>Nutrient Mass Balance for Contemplated Herd Size up to 2,000 Mature Dairy Cows ............. 3-35</td>
</tr>
<tr>
<td>5-10-1</td>
<td>Permit Listing and Implementation Timetable ..................................... 3-37</td>
</tr>
<tr>
<td>4-1-1</td>
<td>Average Monthly Rainfall Data .................................................... 4-4</td>
</tr>
<tr>
<td>4-1-2</td>
<td>NOAA Rain Gauge Data .................................................................. 4-4</td>
</tr>
<tr>
<td>4-3-1</td>
<td>Soils of HDF .............................................................................. 4-8</td>
</tr>
<tr>
<td>4-7-1</td>
<td>Site Type, Site Description and Status ........................................... 4-29</td>
</tr>
<tr>
<td>4-15-1</td>
<td>Food Crop Type and Required Land for Food Self-Sufficiency ................ 4-42</td>
</tr>
<tr>
<td>4-16-1</td>
<td>Information on Wells In and Near to Māhā‘ulepū, Kaua‘i .......................... 4-54</td>
</tr>
<tr>
<td>4-16-2</td>
<td>Water Demand for HDF Operations, Committed Herd Size of 699 Milking Cows ........ 4-59</td>
</tr>
<tr>
<td>4-18-1</td>
<td>Change in Daily Traffic Movement For Committed Herd Size (699 milking cows) ........ 4-69</td>
</tr>
<tr>
<td>4-19-1</td>
<td>Odor Detection Limits for 699 Herd Size ........................................ 4-75</td>
</tr>
<tr>
<td>4-20-1</td>
<td>Proposed Projects in Kōloa-Po‘ipū Area ........................................... 4-80</td>
</tr>
<tr>
<td>4-25-1</td>
<td>Odor Detection Limits for 2,000 Herd Size ....................................... 4-95</td>
</tr>
<tr>
<td>5-2-1</td>
<td>State Land Use Commission Important Agricultural Lands Map (2013) .......... 5-4</td>
</tr>
<tr>
<td>5-11-1</td>
<td>County of Kaua‘i Land Use Map – Kōloa-Po‘ipū-Kalāheo Planning District .... 5-43</td>
</tr>
<tr>
<td>5-12-1</td>
<td>Special Management Area in Vicinity ............................................ 5-44</td>
</tr>
<tr>
<td>5-13-1</td>
<td>County of Kaua‘i Development Plan Map (2012) .................................. 5-45</td>
</tr>
<tr>
<td>6-5-1</td>
<td>Alternative Dairy Location at Kīpū, Kaua‘i ....................................... 6-12</td>
</tr>
</tbody>
</table>
4.26-1 Fugitive Dust Analysis ............................................................................................................... 4-93
4.27-1 Summary of Impacts from the Committed and Contemplated Herd Size .......................... 4-103
5-1 Hawai‘i State Plan, Hawai‘i Revised Statues, Chapter 205 Part III ........................................... 5-4
5-2 Hawai‘i State Plan, Hawai‘i Revised Statues, Chapter 226 .................................................. 5-5
5-3 Hawai‘i 2050 Sustainability Plan (SB2532 HD1, 2010 Legislative Session) ............................. 5-25
5-4 Hawai‘i State Land Use District Boundaries ........................................................................... 5-27
5-5 State of Hawai‘i Water Policies - Department of Health ...................................................... 5-28
5-6 Objectives and Policies of the CZMP .................................................................................... 5-30
5-7 (Elements of the) County of Kaua‘i General Plan ................................................................. 5-32
5-8 County of Kaua‘i - South Kaua‘i Community Plan ................................................................. 5-45
6.4-1 Comparison of Rotational-grazing Pasture vs Feedlot Dairy (699 Cows) ......................... 6-10
6.4-2 Comparison of Rotational-grazing Pasture vs Feedlot Dairy (2,000 Cows) ....................... 6-10
6.5-1 Comparison of Māhāʻulepū Valley Site and Alternative Kauai Location ....................... 6-14
6.7-1 Comparison of Alternatives by Evaluation Criteria .......................................................... 6-18
7-1 Consulted Parties ....................................................................................................................... 7-1

LIST OF TECHNICAL APPENDICES (VOLUME 2)

APPENDIX

A FLORA AND FAUNA SURVEYS
Flora and Fauna Surveys Conducted for the Kauai Dairy Farms Project, Māhāʻulepū, Island of Kaua‘i, Hawai‘i
Rana Biological Consulting, AECOS Consultants. April, 2016.

B MANURE RELATED INSECTS
Cattle Manure-related Insect Species and Biological Controls for Hawai‘i Dairy Farms, Māhāʻulepū, Kaua‘i, Hawai‘i

C SOILS AND AGRONOMY ANALYSIS
Hawai‘i Dairy Farms Soils Baseline Nutrient Status: Implications for Long-Term Sustainability,
Productivity, and Soil Health
Russell Yost, Nicholas Krueger University of Hawai‘i at Mānoa. May, 2016.

D NUTRIENT BALANCE ANALYSIS
Nutrient Balance Analysis for Hawai‘i Dairy Farms

E GROUNDWATER AND SURFACE WATER ANALYSIS
Estimates of the Potential Impact on Groundwater and Surface Water by Hawaii Dairy Farms in Mahaulepu, Kauai
F  SURFACE WATER QUALITY AND MARINE ASSESSMENT  
*Baseline Conditions and an Assessment of the Effect of the Proposed Hawaii Dairy Farm on Surface Water and Marine Water Chemistry Mahaulepu, Kauai, Hawaii*  

G  ARCHAEOLOGICAL INVENTORY SURVEY  
*Archaeological Inventory Survey Report, Māhāʻulepū Ahupuaʻa, Kōloa District, Kauaʻi Island, Hawaiʻi*  
Scientific Consultant Services, Inc. April, 2016.

H  CULTURAL IMPACT ASSESSMENT  
*Cultural Impact Assessment, Māhāʻulepū Ahupuaʻa, Kōloa District, Kauaʻi Island, Hawaiʻi*  
Scientific Consultant Services, Inc. April, 2016.

I  AIR QUALITY/ODOR ASSESSMENT/GREENHOUSE GAS  
*Hawaii Dairy Farms Air Emissions and Odor Evaluation Technical Report*  
Arcadis. April, 2016.

J  DEMOGRAPHIC AND ECONOMIC ANALYSIS  
*Hawai‘i Dairy Farms: Demographic and Economic Assessment*  

K  HYDROLOGIC ASSESSMENT  
*Hydrologic Assessment for the Pasture Areas for Hawai‘i Dairy Farms, Māhāʻulepū, Kaua‘i, Hawai‘i*  
# Abbreviations and Acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AERMOD</td>
<td>Atmospheric Dispersion Modeling System</td>
</tr>
<tr>
<td>AIS</td>
<td>Archaeological Inventory Survey</td>
</tr>
<tr>
<td>ALISH</td>
<td>Agricultural Lands of Importance to the State of Hawai‘i</td>
</tr>
<tr>
<td>AMSL</td>
<td>above mean sea level</td>
</tr>
<tr>
<td>ATTRA</td>
<td>Appropriate Technology Transfer for Rural Areas</td>
</tr>
<tr>
<td>BEACH</td>
<td>Beach Environmental Assessment and Coastal Health Act</td>
</tr>
<tr>
<td>CAA</td>
<td>Clean Air Act</td>
</tr>
<tr>
<td>CAFO</td>
<td>Concentrated Animal Feeding Operation</td>
</tr>
<tr>
<td>CERCLA</td>
<td>Federal Comprehensive Environmental Response, Compensation, and Liability Act</td>
</tr>
<tr>
<td>CIA</td>
<td>Cultural Impact Assessment</td>
</tr>
<tr>
<td>CNPCP</td>
<td>Coastal Nonpoint Pollution Control Program</td>
</tr>
<tr>
<td>COK</td>
<td>County of Kaua‘i</td>
</tr>
<tr>
<td>CTAHR</td>
<td>University of Hawai‘i College of Tropical Agriculture and Human Resources</td>
</tr>
<tr>
<td>CWA</td>
<td>Clean Water Act</td>
</tr>
<tr>
<td>CWB</td>
<td>Department of Health Clean Water Branch</td>
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<tr>
<td>CWCS</td>
<td>Comprehensive Wildlife Conservation Strategy</td>
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<tr>
<td>CWRM</td>
<td>Commission on Water Resource Management</td>
</tr>
<tr>
<td>CZARA</td>
<td>Coastal Zone Act Reauthorization Amendments</td>
</tr>
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<td>CZM</td>
<td>Coastal Zone Management</td>
</tr>
<tr>
<td>CZMA</td>
<td>Coastal Zone Management Act</td>
</tr>
<tr>
<td>CZD</td>
<td>Capture Zone Delineations</td>
</tr>
<tr>
<td>CZO</td>
<td>Comprehensive Zoning Code</td>
</tr>
<tr>
<td>DAPR</td>
<td>days of consecutive rainfall</td>
</tr>
<tr>
<td>dB</td>
<td>decibels</td>
</tr>
<tr>
<td>dBA</td>
<td>A-weighting sound network</td>
</tr>
<tr>
<td>DBEDT</td>
<td>State of Hawai‘i Department of Business, Economic Development and Tourism</td>
</tr>
<tr>
<td>DEIS</td>
<td>Draft Environmental Impact Statement</td>
</tr>
<tr>
<td>DLNR</td>
<td>State of Hawai‘i Department of Land and Natural Resources</td>
</tr>
<tr>
<td>DM</td>
<td>dry material</td>
</tr>
<tr>
<td>DOA</td>
<td>State of Hawai‘i Department of Agriculture</td>
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<tr>
<td>DOH</td>
<td>State of Hawai‘i Department of Health</td>
</tr>
</tbody>
</table>
N  Nitrogen
NAAQS  National Ambient Air Quality Standards
NEH  National Engineering Handbook
NFW  no further work
NMP  Nutrient Management Plan
NOAA  National Oceanic and Atmospheric Administration
NPDES  National Pollution Discharge Elimination System
NRCS  Natural Resources Conservation Service
NWI  Nation Wetlands Inventory
OSDS  on-site disposal systems
OSHA  Occupational Safety and Health Administration
OU  Odor Unit
P  Phosphorous
PBN  Pacific Business News
PC  Partial Circle
PEP  Plasch Econ Pacific
PI  Pacific Islands
PM  particulate matter
SAAQS  State Ambient Air Quality Standards
SART  State Agricultural Response Team
sf  square feet
SHPD  State Historic Preservation Division
SWAP  source water assessment program
SWCD  Soil and Water Conservation District
SWPPP  Stormwater Pollution Prevention Plan
T  tons
TGI  The Garden Island
TMDLs  total maximum daily load limits
TNWRE  Tom Nance Water Resource Engineering
TOT  time-of-travel
TSP  technical service provider
U.H.  University of Hawai‘i
UHT  ultra-high temperate processing
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>U.S.</td>
<td>United States</td>
</tr>
<tr>
<td>USACE</td>
<td>U.S. Army Corps of Engineers</td>
</tr>
<tr>
<td>UST</td>
<td>underground storage tank</td>
</tr>
<tr>
<td>USDA</td>
<td>United States Department of Agriculture</td>
</tr>
<tr>
<td>USFWS</td>
<td>US Fish and Wildlife Service</td>
</tr>
<tr>
<td>USGS</td>
<td>United States Geological Survey</td>
</tr>
<tr>
<td>w/sm</td>
<td>Watts per Square Meter</td>
</tr>
</tbody>
</table>
1.0

PROJECT SUMMARY
1.0 PROJECT SUMMARY

1.1 Project Information Summary

1.2 Proposed Project

1.3 Environmental Review Under Chapter 343, Hawai‘i Revised Statutes

1.4 Significant Beneficial and Adverse Impacts & Proposed Mitigation Measures

1.5 Unresolved Issues

1.6 Summary of Compatibility with Land Use Policies and Plans

1.7 Summary of Alternatives Considered to the Proposed Action

1.8 Listing of Required Government Permits and Approvals

Section 1.0 provides an overview of the contents and purpose of this Environmental Impact Statement (EIS). This section includes a summary description of Hawai‘i Dairy Farms or "Proposed Project", applicable environmental statutes and rules, and the potential impacts, proposed mitigation measures, and alternatives to the Proposed Project. The consistency of the Proposed Project with government land use policies and plans is summarized, along with a discussion of unresolved issues and a listing of required approvals.

1.1 PROJECT INFORMATION SUMMARY

Type of Report: Environmental Impact Statement
Project Name: Hawai‘i Dairy Farms
Applicant: Hawai‘i Dairy Farms, LLC
P.O. Box 1690
Kōloa, Hawai‘i 96756-1690

Planning Consultant: Group 70 International, Inc.
925 Bethel Street, Fifth Floor
Honolulu, Hawai‘i 96813
Jeffrey Overton, AICP, Principal Planner
Telephone: 808-523-5866
Email: HDF@Group70int.com

Approving Agency: State of Hawai‘i Department of Health
Contact: Laura McIntyre, Environmental Planning Office
Telephone: 808-586-4337
Email: Laura.McIntyre@doh.hawaii.gov
Project Location: Māhā'ulepū Valley
Kaua‘i, Hawai‘i (Figure 1-1)

Tax Map Key: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001: 001 portion (Figure 1-2)

Land Owner: Mahaulepu Farm, LLC
3-1850 Kaumuali‘i Highway
Līhu‘e, Hawai‘i 96766

Project Area: 557 acres

Kaua‘i County Zoning: Agriculture

State Land Use District: Agricultural District

Existing Uses: Vacant fallow agricultural land, former sugar plantation

Proposed Use & Components: Agriculture (Dairy) use for dairy buildings, roads, sheds and
ponds, paddocks, cow races, farm roads, irrigation system,
water storage, drainage ways, setbacks/vegetated buffers.

County of Kaua‘i General Plan: Kōloa-Po‘ipū-Kalāheo Planning District

Special Management Area: No

Flood Zone Designation: Zone X

Required Reviews/Permits: County of Kaua‘i
  • Building Permit

State of Hawai‘i
  Department of Land and Natural Resources
  State Historic Preservation Division
  • Hawai‘i Revised Statutes Chapter 6E
    - Historic Preservation Review

  West Kaua‘i Soil and Water Conservation District
  • Conservation Plan

  Department of Health, Clean Water Branch
  • National Pollutant Discharge Elimination
    System (NPDES) Construction Stormwater
    General Permit

  Department of Health, Wastewater Branch
  • Waste Management Plan
  • NPDES Concentrated Animal Feeding Operation
  • Individual Wastewater Permit

  Department of Health, Sanitation Branch
  • Milk Producer Permit
1.2 PROPOSED PROJECT

This section summarizes the project purpose, objectives, evaluation criteria, and project overview. A summary description is provided for the dairy site requirements, buildings and support facilities, utilities, and agricultural infrastructure. The operations of the dairy are summarized for herd management, pasture management, irrigation and nutrient balance, offsite milk processing, offsite herd management and the contemplated herd size.

Project Purpose. The project purpose is to establish a sustainable, pastoral rotational-grazing dairy farm that will increase current local milk production, bolster Hawai‘i’s declining dairy industry, and reduce reliance on imported milk from the mainland United States. The rotational-grazing dairy system utilizes 100 percent of all manure on-site as natural fertilizer to grow grass. This cost-effective method reduces imported fertilizer and feed, and minimizes potential impacts to the environment.

Objectives. Hawai‘i Dairy Farms set eight objectives to achieve to bolster local milk production in Hawai‘i:

1. Provide more than 1,000,000 gallons annually of fresh, nutritious milk for Hawai‘i families and revitalize the dairy industry in Hawai‘i.
2. Apply proven, sustainable pasture-based rotational grazing system and state-of-the-art technology to reduce reliance on costly imported fertilizer and feed.
3. Grow local, quality grass as a primary feedstock optimal for dairy cow nutrition and health, utilizing results of forage research conducted at five sites across four Hawaiian Islands.
4. Design facilities to provide animal comfort, including maximum time on pasture and minimal milking time.
5. Effectively integrate dairy operations within the island community setting.
6. Optimize dairy product shipping and marketing.
7. Provide local farming employment and build the agricultural economy.
8. Protect and enhance the area’s natural, cultural, social and economic environment through sound agricultural planning, preservation of open space and sensitive resources, and development of economic benefit.

Evaluation Criteria. Within the context of the Hawai‘i Dairy Farms Objectives, HDF has established primary evaluation criteria which must be satisfied for the project to be economically, socially and environmentally responsible. The four evaluation criteria include:

1. Secure sufficient contiguous land area under long-term lease with adequate water supply (including potable water to meet standards under milk rules), suitable soil properties, gentle slope conditions, and road accessibility.
2. Generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, livestock management, veterinary and animal husbandry, environmental resources management, milk/milk products processing and dairy business management.
3. Create a model for dairy operations utilizing Important Agricultural Lands (IAL), demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure to advance food self-sufficiency.
4. Utilize 100 percent of manure on site as nutrients to grow forage for dairy cows. Grow sufficient forage to provide 70 to 85 percent of feedstock required for the herd.
HAWAI'I DAIRY FARMS
Draft Environmental Impact Statement

Hawai'i Dairy Farms has been designed to meet the guiding objectives. The project represents a directed effort to establish a pasture-based dairy in Hawai'i that will lead to improving food security for Hawai'i. The model uses a pastoral rotational-grazing system on former sugarcane plantation lands. With the demonstrated success of Hawai'i Dairy Farms, the proponents will be able to continue and expand their community leadership and social investment within Hawai'i by adapting the grazing system to other locations in the state. These objectives and criteria are the guiding parameters that ultimately define the direction for Hawai'i Dairy Farms.

Overview of the Proposed Project. The project will reinvigorate the flagging dairy industry in Hawai'i and establish a financially and environmentally sustainable, pastoral rotational-grazing dairy to provide more than one-million gallons of fresh milk for Hawai'i's families. This section describes the proposed action within the agricultural context of the Māhāʻulepū site, and individual improvements composing the Hawai'i Dairy Farms project.

HDF leases agricultural land in Māhāʻulepū Valley on the south shore of Kaua'i (Figure 1-1 Project Location Map). The 557-acre site consists of portions of three parcels leased from Mahaulepu Farm LLC (Figure 1-2 Tax Map Key). The lease area was surveyed for a metes and bounds description, which modified the acreage from an originally estimated 578-acres to the surveyed 557-acres to allow for access around the perimeter, fencing setbacks, buffers from cultural sites above the farm, and for potential future expansion of the taro farm by the lease-holder.

HDF will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhāʻulepū Valley on the island of Kaua'i to produce fresh, locally available nutritious milk for Hawai'i families. The rotational-grazing method utilizes 100 percent of the cows' manure as fertilizer for pasture grass to provide the primary source of nutrients. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will provide a local food source appropriate for cow health and quality milk production, and will comprise at least 70 percent of the animals’ diet.

HDF has committed to establish a herd of up to 699 mature milking cows. HDF may contemplate possible expansion of the herd up to 2,000 mature milking cows, following the proven success of the rotational-grazing system for local milk production and better understanding the potential carrying capacity of the pasture. While additional regulatory review and public input would be required at that time, this Environmental Impact Statement (EIS) documents the potential impacts from both herd sizes for comparative purposes and full disclosure. Differences in infrastructure or operations for the two herd sizes are noted, where applicable.

Hawai'i Dairy Farms has engaged with the NRCS resource conservationist to seek technical guidance, including consultation with a technical service provider (TSP). A Conservation Plan for the project, which includes a Comprehensive Nutrient Management Plan, was reviewed and accepted by West Kaua'i Soil and Water Conservation District on December 17, 2013.
Figure 1.2-1 Island Location Map
Figure 1.2-2 Project Area Map
Dairy Site Requirements. The 557-acre site consists of 547 acres for paddocks, vegetated buffers ("setbacks") along drainage ways, farm roads, and cow races. A land use summary of the dairy facilities area and pasture area is presented in Table 1-1, and described in Section 3.0.

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilities</td>
<td>Dairy Buildings, Yard, Sheds, Road, Ponds</td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
</tr>
<tr>
<td>Pasture</td>
<td>Paddocks</td>
</tr>
<tr>
<td></td>
<td>Cow Races, Farm Roads, Drainage Ways &amp; Setbacks / Vegetated Buffers</td>
</tr>
<tr>
<td></td>
<td>Subtotal</td>
</tr>
<tr>
<td></td>
<td>Total</td>
</tr>
</tbody>
</table>

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 0.1 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Utilities needed for the dairy facilities include a potable water distribution system from the private on-site well, one domestic individual wastewater system (IWS, a DOH-approved septic system) for the employee restroom, and utility-provided electrical power and communications.

Buildings and Support Facilities. A summary list of buildings and support facilities is provided herein, and described in detail in Section 3.0.

- **Milking Parlor.** The largest building at the dairy, approximately 256-feet long by 88.5-feet wide and 33-feet tall, including a covered loading area, 60-stall rotary milking area, holding pens, mechanical room and pump room, office space, veterinary space and storage, staff restroom and milk storage.
- **Implement Shed.** An implement shed will be used to store equipment, tools, and supplies, and to provide space for farm machinery. Sized at approximately 65-feet long by 26-feet wide by 15-feet tall, the implement shed will be an open bay steel structure on a concrete slab with a metal roof.
- **Calving Sheds.** Newborn calves are kept on the farm until they are approximately 90 days old, housed in sheds to provide for their welfare until they are ready to transition to pasture. The calf sheds are open-bay steel structures with metal roofs on concrete slabs. Each of the two sheds will be approximately 81-feet long by 26-feet wide, and 15-feet tall.
- **Holding Yard.** Cows waiting to enter the milking parlor will move through the holding area as a mob, designed to hold a mob of up to 330 cows at any one time. The yard is approximately 12,300 square feet (150-feet long by 82-feet wide) of concrete slab with surrounding curbs to contain manure captured while the cows await milking and return to pasture; half of the area will be covered with roofing.
- **Effluent Ponds.** Manure and urine will be washed from the holding yard frequently to provide a healthy environment for the cows. Washdown water will be collected and transferred to effluent pond through underground pipes. The collected effluent will be diluted and utilized as natural fertilizer to provide nutrients for pasture grass.
• **Access Road and Tanker Truck Turnaround.** The primary access to the dairy will be from the existing farm road central to the site, via a newly paved 20-foot wide road within the dairy facility. Milk tanker trucks will utilize the Access Road to load milk and to transport milk off-site.

**Utilities for Buildings and Support Facilities.** Utilities servicing the buildings and support facilities are summarized below, and described in detail in Section 3.0.

- **Electrical Power.** Electrical power will be provided through an overhead service connection to the Kaua‘i Island Utility Cooperative (KIUC) grid via existing overhead line. A new three-phase, 75-300 kVA transformer will be installed. Electrical lines will be extended to the dairy in a concrete-encased conduit routed underneath the access road. Additional 500 kW power will be supplied by photovoltaic (PV) panels mounted to structure roofs.

- **Potable Water.** Potable water will be sourced from the existing Māhā‘ulepū Well Battery located within the project site. Water storage tanks holding up to 80,000 gallons will be located adjacent to the milking parlor, and will distribute water into the milking parlor, buildings and paddocks via small booster pumps. Total demand will initially be approximately 30,000 gpd.

- **Domestic Wastewater.** The facilities will be serviced by an individual wastewater system (IWS) to treat wastewater on-site using DOH-approved system (e.g. septic tank). The system will be designed for a flow of 700 gpd, with a 1,500-gallon capacity.

- **Communications.** Telephone and internet service will be provided through an overhead service connection via drop pole to the same subgrade trench as the electrical power, in a separate duct conduit that feeds into a 2-ft. by 4-ft. Hawaiian Telcom pull box.

- **Storm Water Drainage.** Gutters, curbs and swales will direct surface sheet flow. Metal roofing material on dairy buildings will be sloped to adequately sized gutters and downspouts. Roof run-off will be discharged directly to landscaped areas surrounding the buildings. Run-off from areas with the potential for manure will be routed to the effluent storage ponds.

**Agricultural Infrastructure and Utilities.** Agricultural infrastructure and utilities for the dairy operations include storage tanks and silos, effluent storage ponds, irrigation and livestock water systems.

- **Storage Tanks and Silos.** The dairy farm will have milk storage tanks, potable water tanks, gasoline and diesel fuel tanks.

- **Livestock Water Distribution System.** Potable water will come from Māhā‘ulepū Well 14 and be stored in two tanks totaling 80,000 gal capacity. Small diameter water mains will deliver water to raised concrete troughs in each paddock, fitted with valves that allow water flow.

- **Effluent Storage Ponds.** Collection and storage of effluent allows the dairy manager to control the schedule, timing, and mix of nutrients to be applied, as presented in detail in Chapter 3. Sizing of the storage facility allows flexibility in scheduling land application when weather and field conditions are suitable. Design guidance for effluent storage requires sizing of the pond to contain all wastewater, manure, clean water, solids accumulation, net surface rainfall including runoff, and the direct precipitation sized for a 25-year, 24-hour rainfall event. In consideration of the contemplated possible expansion of the herd, the ponds for HDF will be sized to accommodate the potential maximum effluent generated by up to 2,000 milking cows. For the committed herd size of 699 milking cows, the ponds would have excess capacity and minimum storage of 394,956 gal (30-day storage). As a safeguard, the HDF ponds will be sited within a secondary containment area, which provides greater backup containment capacity than called for under the regulatory requirements.
Irrigation for Nutrient Utilization. The utilization of nutrient-laden water in the storage pond will be accomplished through irrigation applications, planned once every four days. The irrigation schedule will be adjusted depending on field conditions. Liquid effluent will be mixed with non-potable water from the Waïta Reservoir, and applied to pastures through a GPS-controlled pivot irrigation system. Slurry created by mixing the solids with non-potable water will be applied through a mobile hard-hose reel dispensed through a gun nozzle, referred to as a gun irrigation system.

Herd Management. The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows will spend 22 of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the milking cows as they graze or are transferred to and from the various paddocks and the milking facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer productive lives with access to fresh air, high quality feed, and exercise while they forage (NRCS, 2007). Following twice-daily milking in the barn, the cows are returned to paddocks. Offsite herd management by Kaua‘i ranchers, which involves raising calves and resting cows, is addressed in Section 3.7.

Pasture Management. The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass. Additional project-specific trials at the Māhāʻulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

Paddocks. The 478.5 acres of pasture will be divided into 122 paddocks ranging from 3 to 5 acres in size. Smaller paddocks are located near the dairy facility and will be used as temporary pasture for cows or calves being moved on or off the farm.

Setbacks. To protect water quality of surface water and downstream areas, paddock fences are set 35-feet back from the top bank of drainage ways. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

Fencing. A permanent perimeter fence will be constructed steel t-posts installed every 10 feet, and a wooden post placed every 50 feet. The fence will include 42-inch woven wire topped with a strand of straight wire at 48-inch height, with a strand of barbed wire at ground level to deter feral pigs. Within the perimeter fence, paddock fencing will consist of two or three strands of electric wire mounted on wooden posts.
• **Forage Productivity.** Kikuyu and Guinea grasses brought in as cattle forage decades ago will be sown to transform the former sugar cane fields into pasture. As the cows excrete on the Kikuyu thatch, nutrients are incorporated into what is effectively an organic net. Due to the high moisture and moderate temperatures, the microbial activity in the thatch is very high and the excreted manure and effluent will be largely broken down by microbial activity within 24 hours. Microbes such as bacteria, protists, and fungi will break down the manure and effluent through decomposition into its nutrient components to make these readily available for uptake into the grass crop and plant matter. Even with the applied manure and effluent nutrients, the grass will need additional nutrient application with conventional fertilizers to maintain optimum grass growth and yield goals at 699 mature dairy cows.

**Irrigation and Nutrient Balance.** Irrigation is the primary method of applying natural fertilizer from the effluent ponds. This section discusses irrigation methods, setbacks, and determination of nutrient application rates.

• **Irrigation.** The total pasture area of the farm is 470 acres. The majority of the pastures will be irrigated with irrigation water and/or diluted effluent through the pivot irrigation systems, with the remainder through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The pivot irrigation system utilizes two central pivots that feed water to an overhead, rotating sprayer supported by trusses mounted on wheeled towers that rotate in a 1,000-foot diameter. Nozzles are suspended approximately four feet from the ground to guide water directly onto the pasture grass. Gun irrigators will be used for areas not covered by the pivots. The gun irrigators utilize a hard-hose reel, which can be moved throughout the farm as needed. The pivot system uses GPS tracking and automation to ensure the ditches and buffer zones do not receive irrigation water.

• **Nutrient Balance.** Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The NRCS Conservation Practice Standard 590 Nutrient Management applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. The timing and application of nutrients should correspond as closely as practical with plant uptake, soil properties and weather conditions. The results from soil testing, manure testing, and forage testing will be utilized to update and inform the nutrient management process for HDF. Application of agricultural waste can be beneficial to soils by improving organic matter, increasing infiltration of water, and improving the soils’ ability to support pasture growth and root establishment.

Nutrient mass balance is described in detail within EIS Section 3 and Appendix D. A concise tabulation of the nutrient mass balance for the committed herd size (up to 699 mature dairy cows) and contemplated herd size (up to 2,000 mature dairy cows) are shown in the tables below.
Table 1-2

Nutrient Mass Balance for Committed Herd Size up to 699 Mature Dairy Cows

<table>
<thead>
<tr>
<th>Nutrient Application</th>
<th>Area (acre)</th>
<th>Nitrogen Applied (lbs N/year)</th>
<th>Phosphorous Applied (lbs P₂O₅ / year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manure As- Excreted</td>
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<td>26,966</td>
</tr>
<tr>
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<tr>
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<td>42.0</td>
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<tr>
<td>Plant Nutrient Demand</td>
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<td>87,317</td>
</tr>
<tr>
<td>Percentage from Animals</td>
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<td>35.8%</td>
</tr>
<tr>
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<td>340,676</td>
<td>56,040</td>
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<tr>
<td>Percentage from Chemical Fertilizer</td>
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<td>69.5%</td>
<td>64.2%</td>
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Nutrient Mass Balance for Contemplated Herd Size up to 2,000 Mature Dairy Cows

<table>
<thead>
<tr>
<th>Nutrient Application</th>
<th>Area (acre)</th>
<th>Nitrogen Applied (lbs N/year)</th>
<th>Phosphorous Applied (lbs P₂O₅ / year)</th>
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<tr>
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<td>23,342.5</td>
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<tr>
<td>Plant Nutrient Demand</td>
<td></td>
<td>490,200</td>
<td>87,317</td>
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<tr>
<td>Percentage from Animals</td>
<td></td>
<td>88.3%</td>
<td>104.2%</td>
</tr>
<tr>
<td>Required Chemical Fertilizer</td>
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<td>57,536</td>
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<td>Percentage from Chemical Fertilizer</td>
<td></td>
<td>11.7%</td>
<td>(4.2%)</td>
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</table>

Off-site Milk Processing. Under the proposed action, milk processing is currently planned via an off-take sale agreement with a milk processor (e.g. HDF sells raw milk wholesale to processor and bottler). Pasteurization must occur on Kaua‘i prior to shipping the fluid milk to O‘ahu for processing to retain product freshness. Milk processing includes pasteurization, bottling and packaging of milk, and possibly other dairy products such as yogurts and cheese. Another potential option for offsite milk products processing would be for Hawai‘i Dairy Farms to process and package the raw milk and possibly create additional dairy products, such as yogurt and cheese. The final products would be sold on Kaua‘i and elsewhere statewide. The offsite processing element of the proposed action would significantly reduce the overall time for milk and milk products to get from farm to table, and would maximize Kaua‘i-based agricultural industry employment. The processing facilities would contain a process unit office, refrigeration units, bulk product storage, bulk product transfers to containers, finished product packaging, and trans-shipment staging and loading.
Offsite Herd Management. Animals in various stages of development/maturity and rest will be transferred between HDF and other existing Kaua’i ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai’i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven't given birth) will be raised until ready to return to the HDF herd as a birthing/milking cow.

Two ranches on Kaua’i will initially work with HDF. Makoa Ranch near Kapa’a is an active cattle ranch run by the Farias family. The ranch will care for dry cows during an annual resting period, and raise calves until ready for return to HDF pasture. Calves suitable as beef cattle will be incorporated into the Makoa Ranch herd or sold to other ranching operations. “Close-up cows” or those cows returning to milk production will initially be transferred to Omao Ranch for transition.

Annually, dairy cows are rested, or “dried” for 60 days before returning to milk production. The existing ranch operations are established and require no additional facilities, permits, or improvements to work with HDF. The fluctuation in herd numbers is typical of cattle operations and poses no impact to the Makoa or Omao Ranches or areas outside the project area. Only the 699 milking cows and calves less than 90 days old will reside on the farm.

Contemplated Herd Size. The committed Proposed Action calls for a herd size of up to 699 milking cows. The contemplated Proposed Action calls for a possible expanded herd up to 2,000 milking cows. The number of animals moving through the dairy facilities would increase under the contemplated herd size. The building design and agricultural infrastructure is capable of accommodating both herd sizes.

1.3 ENVIRONMENTAL REVIEW UNDER CHAPTER 343, HAWAI’I REVISED STATUTES

This Environmental Impact Statement was prepared in accordance with Hawai’i Administrative Rules Title 11 Chapter 200, implementing Hawai’i Revised Statutes (HRS) Chapter 343. An Environmental Impact Statement (EIS) is being prepared by the Applicant to analyze the potential environmental impacts and mitigation measures associated with agricultural operations at Hawai’i Dairy Farms (HDF) at Māhā’ulepū, Kaua’i.

The environmental review process for this project was initiated with the publication of the notice of availability of the Environmental Impact Statement Notice of Preparation (EISPN). The notice was issued by the State Office of Environmental Quality Control (OEQC) in the Environmental Notice issue of February 8, 2015, which underwent a 30-day review period from February 9 through March 11, 2015. All substantive comments received during the review period are addressed in the Draft EIS. Section 7 includes a list of consulted parties (agencies, organizations and individuals), with the comment letters and HDF responses presented in Appendix 3.

Upon its formal submittal and acceptance by the State of Hawai’i Department of Health for publication, the Draft Environmental Impact Statement (DEIS) will undergo a 45-day agency and public review. The substantive comments received during this review period will be addressed, and a written response provided and incorporated into the Final EIS prior to its filing.
1.4 SIGNIFICANT BENEFICIAL AND ADVERSE IMPACTS & PROPOSED MITIGATION MEASURES

Development of the planned improvements for Hawai‘i Dairy Farms will result in numerous beneficial impacts. The project will reinvigorate the flagging dairy industry in Hawai‘i and establish a financially and environmentally sustainable, pastoral rotational-grazing dairy to provide more than 1,000,000 gallons of fresh milk for Hawai‘i’s families. Local and state economic benefits will include construction-related jobs. In the long term, HDF will create a significant number of full-time positions in agricultural operations, along with support for local ranchers. As such, the significant impacts of the Hawai‘i Dairy Farms are anticipated to be largely beneficial, as discussed below. Mitigative measures are proposed to offset potential adverse impacts. Section 4.0 of the DEIS presents the environmental setting, potential impacts and mitigation measures.

1.4.1 BENEFICIAL IMPACTS

Implementation of Hawai‘i Dairy Farms will provide many benefits for Kaua‘i and Hawai‘i including local milk production, food sustainability, agricultural employment, community benefit investments and youth education. A summary of these beneficial impacts is listed below.

- **Increased Local Milk Production.** Doubling of statewide local milk production to provide more than 1,000,000 gallons of fresh milk for Hawai‘i’s families. The contemplated herd size has the potential to produce over 3,000,000 gallons of fresh milk per year, and provide statewide distribution of more local milk.
- **New Long-Term Agricultural Employment.** Creation of up to 28 operational jobs, as well as construction jobs and local supplier opportunities in support of agriculture on Kaua‘i.
- **Support for Agriculture on Kaua‘i.** Hawai‘i Dairy Farms will provide the first large-scale commercial use of Important Agricultural Lands on Kaua‘i. The dairy will create a $17.5 million investment in local food production without any government subsidies. Significant opportunities for local ranchers will be created for dairy herd management support.
- **Increased Soil Conservation.** Pasture creation and management with Hawai‘i Dairy Farms will stabilize and protect soils across nearly 500 acres at Māhāulepū, reducing soil erosion and suspended sediment runoff to drainage ways and the nearshore ocean waters. In addition, the pasture based system will improve and revitalize the current soils and farming productivity of the land.
- **Investments in Community Benefits and Youth Education.** Hawai‘i Dairy Farms will provide community benefit investments in related causes through donations. HDF will work with the 4-H and FFA to educate keiki about STEM-based agricultural jobs and animal husbandry.
- **Increased Net Revenues to County and State Governments.** Hawai‘i Dairy Farms will create $6 million to $9 million in annual operating expenditures to help support Kaua‘i’s economy, providing net revenues to County and State governments.
1.4.2 PROBABLE ADVERSE IMPACTS

Implementation of Hawai‘i Dairy Farms will produce potential short-term and long-term impacts. General categories of actions for the dairy establishment and operational actions include:

- Establishment of 470 acres of grazing pasture, paddocks, fencing and farm roads
- Construction of dairy facilities buildings and support infrastructure on less than 10 acres
- Implementation of dairy operations with a committed herd size of 699 mature milking cows
- Potential implementation of a contemplated herd size of up to 2,000 mature milking cows

To complete the improvements required to establish the dairy facilities and paddocks, there will be localized short-term construction-related impacts on the environment. Potential short-term impacts due to construction-related activities evaluated in the EIS include soil disturbance, dust and soil erosion, limited excavation and grading, fauna disruption, and traffic in the project vicinity due to construction equipment and trucks, and increased noise due to construction-related operations. Potential drainage and runoff related to construction are also evaluated.

Over the long term, impacts associated with the implementation of Hawai‘i Dairy Farms are anticipated to be modest and consistent with the agricultural setting in which the farm is located. Section 4.0 addresses the potential long-term effects of the dairy farm, in categories such as archaeological resources, cultural resources, soils, air quality, water quality, traffic, employment, government revenues, visual resources and infrastructure. The dairy farm will create both negative and beneficial long-term impacts in these categories, with mitigation measures to offset detrimental effects addressed in Section 1.4.3 and Chapter 4.0.

With the dairy in operation, during periodic seasonal storm water runoff events (about 10 times/yr) there may be additional nutrients introduced to the agricultural ditches, which ultimately drain to the nearshore ocean water. The findings of the water quality evaluations are presented in Sections 4.16, 4.17, 4.22 and 4.23. The complete studies are presented in Appendix E and Appendix F. There is also the potential for vector insects such as flies to become established at the dairy farm, controlled by Integrated Pest Management measures. The findings of the manure-related insect study are presented in Section 4.11, and the complete study is presented in Appendix B. Air quality in the immediate vicinity of the dairy farm (within 1,700 feet) may, in the worst-case conditions, be affected with odors from the effluent pond and manure in the pasture paddocks. The findings of the air quality odor model are presented in Sections 4.19 and 4.25, and the complete study is presented in Appendix I.

1.4.3 PROPOSED MITIGATION MEASURES

There are few potential long-term adverse impacts anticipated to result from the construction and implementation of Hawai‘i Dairy Farms. Relative to the agricultural, social, economic and employment benefits that are expected to result from the dairy operation, with application of the various mitigation measures described in the EIS, the potential adverse impacts are not considered significant. Potential short-term impacts due to construction activities will be limited to construction efforts such as earthwork, noise, visual and temporary air quality impacts related to dust and equipment emissions. Long-term impacts are expected to be modest and consistent with the agricultural environment in which the dairy farm is located. Potential short-term and long-term impacts, and mitigation measures are discussed in detail in Chapter 4.0 and summarized below.
Soil Erosion Mitigation. Short-term soils loss will be controlled by proper construction site management and best management practices. Pursuant to the NRCS Conservation Plan, long term soil losses will be minimized. Pasture creation and management with Hawai‘i Dairy Farms will stabilize and protect soils across nearly 500 acres at Māhā‘ulepū, reducing soil erosion and suspended sediment runoff to drainage ways and the nearshore ocean waters. Vegetated buffer zones and Best Management Practices will be employed to minimize soil erosion.

Water Quality Mitigation. To sustain pasture grasses, there will be nutrients added through the application of effluent pond water and commercial fertilizers, and some nutrients will pass through soils and enter the agricultural ditches. Nutrient loss will be minimized through vigorous pasture grass cover and thatch, and 35 ft wide vegetation buffers maintained along the agricultural ditches. Irrigation water will not be applied within 50 ft of the agricultural ditches. The vegetated buffers will also deter the movement of manure particles carried in runoff during peak storm events. These numerous mitigation actions by the dairy operations will minimize adverse effects to water quality and have minimal to no effects on nearshore marine water per Appendices F and K.

Archaeological and Cultural Resource Mitigation. An Archaeological Inventory Survey (AIS) was conducted for the project, and is being reviewed for approval by the State Historic Preservation Division (SHPD). Based on the findings of the AIS and SHPD review, there are no archaeological sites on site, only historic period agricultural features. As directed by SHPD, potential requirements for on-site archaeological monitoring of construction activities will be implemented.

Pest Insect (Flies) Mitigation. The potential for the dairy to generate new fly populations at the dairy facilities will be mitigated by diligent housekeeping to wash down active areas at the milking parlor and holding pens to minimize waste accumulation and fly populations. Best Management Practices and Integrated Pest Management measures will minimize fly populations. Introduction of dung beetles to the pasture paddocks will substantially hasten the breakdown of manure and minimize fly populations. With these mitigation measures, the dairy is not expected to increase the fly population affecting the surrounding offsite area.

Odor Mitigation. The potential for odors to be generated by the dairy facilities will be mitigated by diligent housekeeping to wash down active areas at the milking parlor and holding pens to minimize waste accumulation and subsequent odor generation. Management of the effluent ponds and effective operation of the irrigation system will further reduce the potential for odor generation. Introduction of dung beetles to the pasture paddocks will increase manure breakdown and minimize odor generation. With these mitigation measures, the dairy is not expected to generate adverse odors which would affect the surrounding offsite area.

Air Quality Mitigation. The impact of construction activity on air quality will be mitigated by conforming to dust control measures, particularly those specified in the State Department of Health’s (DOH) Ambient Air Quality Standards, Chapter 11-59, Hawai‘i Administrative Rules.

Noise Mitigation. Temporary but unavoidable noise impacts may occur during the construction activities within the area. The use of properly muffled construction equipment will help ameliorate these impacts. The incorporation of State DOH construction noise limits and curfew times, which are applicable throughout the State of Hawai‘i, is another noise mitigation measure which is normally applied to construction activities. Once construction is completed, there will be minor additional noise impacts resulting from some dairy equipment operations.
Traffic Mitigation. During the construction phase of the dairy, some inconvenience is anticipated, as the delivery of construction equipment, construction worker vehicles and materials will utilize area roadways to access the dairy site. Efforts will be made to minimize conflicts with traffic along the area roadways during construction activities. In coordination with State and County authorities, these activities will follow applicable rules and permits for transport, including routing and required additional safety escort vehicles. Traffic operations along the area roadways and intersections will not be significantly affected.

1.5 UNRESOLVED ISSUES

Below are identified issues that are being actively addressed, but which are currently unresolved.

Resolution of the Dairy Herd Size. Successful dairy farming involves the mastery of numerous elements, such as soil science, agronomy and animal husbandry. The final scaling of the milking cow herd size for the Hawai‘i Dairy Farms operations will ultimately be determined based on the results of pasture grass development at the Māhā‘ulepū site, and dairy cow milk production levels. HDF has committed to no more than 699 milking cows. Any expansion would depend on many factors that would be resolved in the future based on how the biomass and natural systems perform with 699 milking cows. Up to the committed herd size, this will be an iterative process of monitoring and testing to determine the best approaches to optimize dairy operations and foster good health in the natural systems.

It is anticipated that the HDF dairy herd can be increased well beyond 1,000 to 1,500 milking cows and be sustainable from an operational and environmental perspective. Expansion beyond the 699 milking cows level will require issuance of a CAFO/NPDES permit by the State Dept of Health. With careful monitoring of the operations and the natural systems, including the soils, pasture grasses and water quality, the dairy scaling can be accomplished with sensitivity to the various indicators of carrying capacity. The potential for HDF to reach the upper scale of 2,000 milking cows at the dairy may or may not ultimately occur, depending upon the operational sensitivities and the indicators shown by the carefully monitored natural systems.

Milk Products Processing. The scope of milk processing operations has yet to be resolved. The location for the milk processing activity has not been finalized. The opportunity to undertake value-added processing steps in milk products processing could also be conducted on-island. Completion of milk products processing on-island would create additional employment and government revenues for Kaua‘i, increase the availability of local milk products, and further bolster the local agricultural economy. If milk products processing is not undertaken on Kaua‘i, the pasteurized milk would be shipped in bulk to one of the existing processing facilities on O‘ahu or Hawai‘i Island for further process steps, packaging and marketing.

1.6 SUMMARY OF COMPATIBILITY WITH LAND USE POLICIES AND PLANS

The planned improvements and operations at Hawai‘i Dairy Farms are compatible with and supportive of State of Hawai‘i and County of Kaua‘i land use policies, plans and control related to the natural and social environment. The Proposed Project is consistent with and permitted by applicable land use designations and, as discussed in Section 5.0, will contribute a wide range of benefits to further established goals, objectives and policies. In particular, Hawai‘i Dairy Farms is consistent with the State and County initiatives for food sustainability and the long-term intended use of Important Agricultural Land on Kaua‘i. The dairy is also consistent with the provisions of the State of Hawai‘i Agricultural Functional Plan, and long-range planning for diversified agricultural use of Māhā‘ulepū lands under the County of Kaua‘i General Plan and the South Kaua‘i Community Development Plan.
1.7 SUMMARY OF ALTERNATIVES CONSIDERED TO THE PROPOSED ACTION

Hawai‘i Dairy Farms represents the current vision and intent to create a state of the art pasture-based, rotational grazing dairy. The Draft EIS evaluates alternatives that meet the project’s Purpose and Need, and considers changes to dairy operations and location. Alternatives to the Proposed Project are evaluated in Section 6.0. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200), requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. A range of potential alternative actions may be contemplated for the future, however, several alternatives which do not meet the project purpose are not advanced for detailed analysis of environmental benefits, costs, and risks. The options considered but not meeting the project purpose included: conservation condemnation, rezoning/development for urban/resort use, development of an agricultural subdivision, and a large scale agricultural park and truck crop processing center.

Those alternatives carried forward in the Alternatives Analysis for further evaluation are several alternatives to the Proposed Project which could attain the objectives of the action. EIS law calls for rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. The alternatives considered include the following:

1. The Alternative of “No Action”,
2. Conventional Feedlot Dairy Alternative,
3. Alternative Location for Pasture-Based Dairy, and
4. Milk Processing Alternative by HDF.

A summary description and evaluation is presented for each alternative in Section 1.7.1 to 1.7.4.

1.7.1 NO-ACTION ALTERNATIVE

The No-Action Alternative would continue future use of agricultural property without the establishment of the sustainable pasture-based dairy operations. With the Important Agricultural Lands designation, this land is expected to be used for either grazing or cultivation. Portions of the property would be available for cattle and sheep grazing, or other more intensive agricultural uses. The property would be available for beef cattle grazing with a herd size of several hundred animals to become re-established, potentially with the addition of sheep or other animals. Use of these lands for cattle or sheep grazing pasture could be re-established, with cattle and/or sheep grazing on the 557 acre pasture area. At the stocking rate of two to four animals per acre, common to Kaua‘i grazing lands, the total number of cattle and sheep grazing could potentially be 2,000 animals.

With a traditional grazing operation in the No-Action Alternative, no special provisions would be required for managing agricultural land use, cover crops and runoff. Soil loss and surface water quality impacts would be consistent with large animal grazing operations, as occurs commonly on large agricultural lands on Kaua‘i. With no site-specific operational controls, the grazing lease operations would be covered under the existing agricultural conservation plan applicable to the broad suite of agricultural uses on agricultural lands at Māhā‘ulepū. Surface water quality would be degraded through storm runoff of animal waste and suspended sediment.
There would be no new agricultural employment with this alternative. Further, this alternative does not meet the purpose and need of the proposed action, as it does not provide support for a unique underrepresented industry like dairy, which is overly imported in the state of Hawai‘i, and therefore was not subjected to further evaluation.

1.7.2 CONVENTIONAL FEEDLOT DAIRY ALTERNATIVE

The development and operation of a conventional feedlot dairy would potentially achieve the project purpose to increase local milk production. This alternative would utilize the conventional methods for a large-scale commercial dairy in which milking cows are confined in large all-weather barn facilities, without access to forage and without pastures. A total of either 699 or 2,000 dairy cows would be confined within several large barns. The dairy farm complex would occupy a land area of approximately 5.5 to 12.5 acres, with dairy facilities consisting of several large barns, milking parlor, storage buildings, feed storage and waste storage lagoons.

The requirement to supply imported feed would be significant, estimated at 8 to 10 tons per day for a mature milking cow herd of 699 cows, or 25 to 30 tons per day for up to 2,000 cows. All of this imported feed would need to be imported to Kaua‘i, and transported to the dairy. It is noted that history showed the decline of Hawai‘i’s dairy industry and eventual demise largely due to the escalating cost of feed imported from the mainland U.S.

There would be potential long-term impacts associated with operations of the conventional feedlot alternative. Due to the higher density of animals in the barn area and a limited pasture area, the conventional feedlot alternative has a higher concentration of manure and urine waste. The barn and milking parlor facilities would require additional potable water use for the regular wash down of the large barn areas to manage sanitary conditions. The concentration of animal waste would pose the potential for increased populations of pest insects, such as flies, occurring with the conventional feedlot alternative. In addition, there would be the potential for adverse odors to be generated by the conventional feedlot operations, due to the animal waste concentration in the barns, yards and large waste ponds. The conventional feedlot dairy would also have substantial impacts in terms of truck traffic, water use, waste disposal and energy use.

Although this alternative could potentially meet the purpose and need of the proposed action, it would also produce comparatively greater environmental impacts and public health risks than the proposed action. Section 6.0 presents an evaluation of this alternative, and a comparison of the proposed project with this alternative.

1.7.3 ALTERNATIVE LOCATION FOR THE PASTURE-BASED DAIRY

An alternative Kaua‘i location using a site other than Māhā‘ulepū would be considered under this alternative. The pasture-based dairy operation requires 500 to 600 acres of usable, gently-sloped land on agricultural zoned lands available for long-term lease. The micro-climate requires soil conditions favorable for nutrient absorption with access to a reasonably priced irrigation water source, to sustain nutritious grass pastures. Other required elements would include roadway access, potable water and irrigation water sources.
The high-level evaluation of 33,000 acres of Grove Farm holdings under the screening criteria as potential lands to locate a pasture-based dairy, as summarized below.

- Conservation District lands and Urban lands owned by Grove Farms could not be considered for the pasture-based dairy due to inappropriate zoning/land use compatibility.
- Long-term farming leases exist across major portions of the Grove Farm agricultural holdings, along with investments (e.g. crops, livestock, improvements and facilities).
- Inland mauka agricultural lands receive high annual rainfall and lower incident sunlight, with suboptimal pasture grass growing conditions.
- Agricultural lands mauka of Kuhio Highway and Kaumualii Highway generally have steep slopes, non-contiguous areas, and some rocky soils, all factors affecting animal stress.
- Irrigation water availability varies due to proximity to existing reservoirs and wells.
- Areas up-gradient of established County and private wells for drinking water supply.
- Unavailable or inadequate support infrastructure at mauka locations.

An alternative location for the pasture-based dairy was considered on approximately 972 acres of Grove Farm agricultural land at Puhi. The alternative location would potentially satisfy some of the evaluation criteria in terms of slopes, soils, micro-climate, water supply and support infrastructure. Under the comparative evaluation criteria for site screening identification, the alternative site would be less suitable than the Māhā’ulepū site due to land tenure, greater slopes, higher rainfall and less sunlight, with a perennial stream draining into a wildlife refuge.

Although this alternative could potentially meet the purpose and need of the proposed action, it would also produce comparatively greater environmental impacts than the proposed action. Section 6.0 presents an evaluation of this alternative, and a comparison of the proposed project with this alternative.

1.7.4 MILK PROCESSING ALTERNATIVE BY HDF

An alternative is for HDF to pasteurize raw milk on the island of Kaua‘i. The pasteurized milk could then be sold to a processor/bottler. Currently, Meadow Gold is the only processor/packager with operational facilities on both O‘ahu and Hawai‘i island. Any pasteurization or processing facility would be sited in an appropriately zoned industrial area with access to adequate electricity, municipal potable water and wastewater services, and with existing roadway infrastructure suitable for required truck transport. On the island of Kaua‘i, an opportunity exists to retrofit and utilize the closed processing facility in Puhi, though this alternative requires cooperation of the facility owner, Meadow Gold. Capital expenditure for the retrofit could be more than $1 million.

The processing alternative by HDF would have no significant environmental impacts. The processing facility would be sited on lands with appropriate zoning for milk processing and accessory uses without a need for obtaining additional special permits. Traffic associated with processing would add worker vehicle trips to the facility. Noise from worker vehicles and trucks would increase slightly due to the shipping. Vehicle emissions would also occur as a result of these shipments. The interisland transfers would occur as part of other freight components shipped on the existing regularly scheduled barge transits.

In-state milk production would increase agricultural revenues and jobs in Hawai‘i. With HDF processing, employment in the manufacturing industry would increase. Processing would generate substantial positive State and County revenues. The milk processing operation would require potable water from the County system. The processing operation would also generate wastewater discharged to the County sewer system. This alternative could potentially meet the purpose and need of the proposed action.
1.8 LISTING OF REQUIRED GOVERNMENT PERMITS AND APPROVALS

Table 1-3 identifies the major State and County land use permits and approvals that are anticipated to be required for the project, including site, building, construction and infrastructure approvals. Agricultural facilities and operations of HDF will require reviews and approvals from federal, state and county agencies and entities. Should HDF elect to expand the dairy beyond 699 milking cows, additional permitting is required.

**Table 1-3  State and County Land Use Permits and Approvals**

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<td>Conservation Plan</td>
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<td>Paddocks and Pasture (Grass Establishment)</td>
<td>HDF</td>
<td></td>
<td>2017 - 2018</td>
</tr>
<tr>
<td>Milk Producer Permit / Operational Permits</td>
<td>HDOH / USDA</td>
<td></td>
<td>2017</td>
</tr>
<tr>
<td>Permit Closeout / Certificate of Occupancy</td>
<td>HDF</td>
<td></td>
<td>2017</td>
</tr>
<tr>
<td>Start of Operations (699 Mature Dairy Cows)</td>
<td>HDF</td>
<td></td>
<td>2018</td>
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<td><strong>Contemplated Herd Size (2,000 Mature Dairy Cows)</strong></td>
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<tr>
<td>Waste Management Plan (2,000 Cows)</td>
<td>HDOH</td>
<td></td>
<td>To be determined</td>
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<tr>
<td>NPDES – CAFO Permit (2,000 Cows)</td>
<td>HDOH</td>
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<td>To be determined</td>
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2.0

PURPOSE AND NEED OF THE PROPOSED PROJECT
2.0 PURPOSE AND NEED OF THE PROPOSED PROJECT

2.1 INTRODUCTION AND BACKGROUND

Hawaii is an island state, with a total population of roughly 1.4 million people (U.S. Census Bureau, 2015). Roughly 70 percent of the state’s population is centered on the island of O‘ahu, with smaller populations on the neighbor islands of Hawaii, Maui, Moloka‘i, Lana‘i and Kaua‘i. Hawaii’s indigenous population cultivated rich agricultural lands for sustenance, using food stock brought aboard the sailing canoes with the original island settlers. Agricultural field systems were created inland, close to fresh water resources. Kalo (taro), a staple crop, was cultivated in both irrigated and dry fields. Other dry land agriculture crops included ‘uala (sweet potato), uhi (yams), mai‘a (bananas), ipu (gourds), and kō (sugar cane).

Following European contact, large tracts of land were used for monoculture crop production (notably sugarcane and pineapple). These plantation crops served as the islands’ major economic industry for over a century. Large-scale plantation farms were phased out by the late 1900s, as land and labor costs drove sugar and pineapple production to countries with lower production costs. Agricultural lands of the plantation era have largely remained fallow, with some areas converted to cultivation of a wide range of diversified agriculture products.

The majority of goods used in the state, including the daily food requirements of its residents, arrive via ocean and air shipping. Roughly 90 percent of all food products consumed in Hawaii are imported, and the current population size makes food importation an increasingly practical necessity. Today’s insulated and refrigerated ocean freight containers allow perishable goods, such as fresh produce, milk and milk products, to sustain the seven- to ten-day transit time for import from the mainland United States (U.S.) or abroad. With optimized just-in-time delivery schedules for big box retail and grocery businesses, there is limited food supply in storage. It is estimated that the on-island food storage represents less than a two-week supply. This fact highlights Hawaii’s vulnerability and its dependency on imported food. Whether a natural disaster such as a hurricane or labor dispute affects shipping, or geopolitical events such as 9-11, the islands are in jeopardy of a serious disruption to the food supply.
The State of Hawai‘i Office of Planning, in cooperation with the Department of Agriculture, issued a report in October 2012 entitled: 

**Increased Food Security and Food Self-Sufficiency Strategy.** The report sets forth policies and action to increase the amount of locally grown food consumed by Hawai‘i residents. Today, with cooperation by private landowners, actions to increase food self-sufficiency and food security are being initiated across the state. Milk and milk products represent perishable goods providing important nutrition that could be produced entirely in Hawai‘i, and interest has grown to reestablish Hawai‘i’s dairy industry.

Located at the western end of the island chain, the island of Kaua‘i is known for its remote setting, lush green landscape, soaring mountain ridges and raw natural beauty. The island is characterized by smaller towns totaling approximately 70,000 residents, supported by the visitor industry, agriculture, the military and a modest service economy. Large areas of prime agricultural lands have gone fallow since the closing of the sugar plantation era, with some used for grazing, and portions cultivated for seed crops and diversified agriculture products.

Concomitantly, Kaua‘i residents have been concerned about issues that hamper and impact the island as a community. Prominent issues include: employment and economic stability; opportunities for affordable housing; the scale and pace of real estate and urban land development; providing for renewable energy; food production on important agricultural lands; protection of water source and quality, and endangered species and habitats; and retention of Hawaiian cultural sites and cultural values. The proposed project supports Kaua‘i’s social and economic function, and focuses on improving Hawai‘i’s food sustainability.

![Image](image.png)

**Figure 2.1-1 County and State Plans Supportive of Agricultural Self-Sufficiency**
2.2 History of the Dairy Industry in Hawai‘i

Dairies have been a component of the Hawai‘i agricultural industry for over two centuries. Cattle were first brought to the islands in 1793. Records suggest that dairy cattle were introduced in the late 1800s, with the first commercial dairy in 1869; by 1880, there were five dairy operations. Many plantations across the state developed small dairy operations to support their agricultural communities. During World War II, dairy farms played an important role in the health and nutrition of the military, as milk was provided free to the injured personnel.

The island of Kaua‘i has a rich dairy history. By 1923, Kaua‘i hosted 34 dairy cattle farms operating on smaller farms across the island as plantation dairies. Many dairy operations on Kaua‘i did not persist after World War II due to increased regulations such as pasteurization, which required expensive facilities. Hawai‘i Island dairies were located in Kohala and Hamakua. Haleakala Ranch Dairy supplied the island of Maui starting in 1896. By 1955, the number of dairies in the state was somewhere between 86 and 90 farms, and the cow populations peaked in 1965 with 15,100 head. The state’s population was 711,000 residents. While each of the islands had numerous dairy operations, O‘ahu had the largest concentration of dairy cows and operations: Pacific Dairy in Wai‘anae; Waimanalo Dairy Farm; and Meadow Gold Dairy, initially in Waialae and moved to Kawailoa.

By the early 1960s, the Waimea Dairy and Sokei Dairy in Kapa‘a were the two largest dairies on Kaua‘i. Both were acquired by Meadow Gold Dairies Hawai‘i, which ran the 170-acre Moloa’a Dairy and developed a milk processing facility in Puhi (The Garden Island, 2014). Dairy operations were eventually consolidated at Moloa’a, which closed in 2000. Reasons for the closure included market competition from rapidly consolidating regional and national producers with large-scale production advantages in lower cost areas, and the advent of bulk milk importation to Hawai‘i. The smaller local operation at Moloa’a Dairy struggled with the relatively high land, labor and regulatory costs (D. Moriki; The Garden Island, 2/26/14).

By 1974 on O‘ahu, increased urbanization pushed dairy operations from pastures to dry lot operations in Wai‘anae. The lack of forage combined with drier region of high daily temperatures increased animal stress and reduced milk production. In 1980, the cow population in Hawai‘i began to decrease. While periodic growth occurred from the mid-1980s to 1990, costs of imported feed and transportation, milk prices, and aging dairy owners contributed to the industry decline. By 2008, operational expenses had skyrocketed. Combined with milk price regulations limiting price paid to the farmer, nearly all of Hawai‘i’s local dairies closed.

2.2.1 The Dairy Market in Hawai‘i

Peak milk production in the state was 160 million pounds in 1988; by 2006, production had declined by more than 64 percent to 57 million pounds (HDOA, 2013). In 1988, Hawai‘i’s dairy industry was valued in excess of $33 million, and declined 45 percent over seven years to just $18 million in 2005 (HDOA, 2013). Current production is 1.75 million gallons annually, which equates to just over 15 million pounds. The demise of Hawai‘i’s dairies stemmed from the higher cost of local milk production and loss of market presence due to competitive lower cost imported milk from the mainland U.S. To face the market forces and offset a portion of the market served by imported product, Hawai‘i dairy businesses must overcome the hurdles in production, processing, distribution and market reach.
Until 1984, 100 percent of Hawai‘i’s milk was produced by local dairies. The first milk was imported to Hawai‘i in 1985 by Safeway with the introduction of its Lucerne brand into the market (HDOA, 2013). By the mid-1990s, the two largest milk processors, Foremost Dairies and Meadow Gold Hawai‘i, began importing milk in bulk for local processing. Currently, Meadow Gold (Dean Foods) is the only company in Hawai‘i that processes and packages fluid milk, with facilities in Honolulu and Hilo. As of 2015, only 10 percent of the fluid milk sold in the islands is from local dairies.

The only two remaining dairies are located on the island of Hawai‘i (the Big Island): Big Island Dairy in O‘okala; and Clover Leaf Dairy in ‘Upolu. These dairies haul fluid milk product using their trucks and drivers to the Meadow Gold processing plant in Hilo. Big Island Dairy milk is marketed as "Mountain Apple" brand through KTA Supermarkets on the island of Hawai‘i, and as “Hawai‘i’s Fresh” on other islands. With a June, 2015 announcement that Meadow Gold will reduce the price it pays to Hawai‘i farmers by 23 percent, the Big Island dairies face serious obstacles to sustain operations (Hawai‘i News Now, 2015). A new endeavor on the Big Island to produce milk for cheese using a herd of approximately 200 cows fed on pasture and locally-grown corn anticipates beginning commercial operation in 2016 (Pacific Business News, 2014).

The majority of Hawai‘i’s milk supply is shipped in bulk containers from the U.S. West Coast. Meadow Gold’s Honolulu processing plant imports pasteurized milk in bulk insulated tanks. These bulk tanks travel unrefrigerated, with milk deemed acceptable if the temperature is below 45°F when received at the plant (HDOA, 2013). The tanks of skim milk and whole milk are re-pasteurized and blended to provide a product mix of mostly lower fat fluid milks. The Hawai‘i State Department of Agriculture estimated milk from California takes 8 to 12 days to make it to a store shelf in Hawai‘i (HDOA, 2013). With a 16 to 18-day shelf life remaining, milk purchased may be 24 to 30 days from the date of milking.

Packaged milk and milk products are brought in by various grocers and large retailers and transported directly to the retail store. Most is shipped in refrigerated containers. A smaller portion of packaged milk, including organic milk, undergoes ultra-high temperature processing (UHT) that sterilizes food by heating it above 275°F. This makes the product "shelf safe" which means it does not require refrigeration until opened. Most organic milk undergoes this process but rather than being packaged in aseptic, shelf safe cartons, it is packaged in the classic milk carton and sold in the refrigerated section of a retail store. This extends its shelf life to 90 days.

A simple analysis of current population and potential fluid milk demand in the State of Hawai‘i indicates the entire size of the market is approximately 22,000 cows (HDOA, 2013). Based on U.S. per capita consumption rates, fresh milk consumption in Hawai‘i is estimated at a potential 597,000 gallons per week. Meadow Gold currently experiences demand for approximately 400,000 gallons per week. The difference is supplied by packaged milk shipped directly by grocers and big box retailers.

Dairy operations in Hawai‘i face significant hurdles, including a monopoly milk processor, limited breeding stock, and a need to educate the consumer on benefits of truly local milk. For Hawai‘i to re-establish its dairy industry, it will require the introduction of advanced dairy farming technologies, efficient operational processes, and monitoring to ensure environmental protection standards are upheld.
More than six years ago, Grove Farm Company, Incorporated (Grove Farm) began contemplating how to restart Kaua‘i’s dairy industry. Alternatives to the conventional feedlot based dairy were considered, and a pasture-based model was determined to be a clean, cost-effective and sustainable method. Sustainable is defined in this EIS as:

_Meeting the needs of the present without compromising the ability of future generations to meet their own needs._

Grove Farm partnered with Finistere Ventures, Kamehameha Schools, Maui Land & Pineapple, and Ulupono Initiative to conduct grass trials on four islands to identify productive lands capable of growing nutritious forage for dairy cows. Māhā‘ulepū Valley was determined to provide ideal conditions and to meet criteria required to establish a successful dairy venture including dedication of the land to agriculture through Important Agricultural Lands designation, allowing for long-term lease, ample water source, and relatively flat land to avoid stress on cows.

2.2.2 IMPORTANT AGRICULTURAL LANDS

Article XI of the Constitution of the State of Hawai‘i includes conservation and protection of natural resources and lands, including agricultural lands. In a 1978 amendment to the Constitution, the concept of “important agricultural lands” (IAL) emerged in Section 3, Article XI: “The State shall conserve and protect agricultural lands, promote diversified agriculture, increase agricultural self-sufficiency and assure the availability of agriculturally suitable lands. The legislature shall provide standards and criteria to accomplish the foregoing.

Lands identified by the State as important agricultural lands needed to fulfill the purposes above shall not be reclassified by the State or rezoned by its political subdivisions without meeting the standards and criteria established by the legislature and approved by a two-thirds vote of the body responsible for the reclassification or rezoning action.”

Not until 2005 were “important agricultural lands” established in statute. After decades of debate, farmers and landowners formed a historic alliance and joined with the Department of Agriculture, State Land Use Commission, Office of Planning, and members of the legislature to pass Act 183 (HDOA, 2007). Important Agricultural Lands were defined as those:

- capable of producing sustained high agricultural yields when treated and managed according to accepted farming methods and technology;
- that contribute to the state’s economic base and produce agricultural commodities for export or local consumption; and
- needed to promote the expansion of agricultural activities and income for the future, even if currently not in production.

Eight specific criteria were provided, and lands meeting any of the criteria are eligible for consideration. Act 233 of 2008 established landowner incentives, such as tax credits and loan guarantees, to encourage voluntary designation of lands as IAL. The IAL designation makes it more difficult to utilize lands for non-agricultural purposes by the Constitutional requirement for a two-thirds vote of the governing body responsible for the reclassification or rezoning.
On the island of Kaua‘i, landowner Grove Farm was proactive in the identification and retention of Important Agricultural Lands within its holdings. In 2011, Mahaulepu Farm LLC (formed by Grove Farm), petitioned and received IAL designation for 1,533 acres in Māhā‘ulepū. The designation meets the objectives of Hawai‘i’s IAL land use law by contributing to the maintenance of a strategic agricultural land resource base to support a diversity of agricultural activities and opportunities that expand income and job opportunities.

Māhā‘ulepū has been an agricultural center on Kaua‘i for centuries. Farming occupied the low slope areas in Māhā‘ulepū, and ranching used the uncultivated areas surrounding the valley for grazing. Since the demise of sugarcane in the 1990s, some acreage is cultivated for the seed industry, though most former agricultural fields have been under-utilized or vacant since. Recent efforts by Grove Farm to revitalize agriculture in the area involved an agricultural park concept in Māhā‘ulepū to make parcels appropriate for small farm operations. Operations established through the agricultural park offering include Haraguchi Taro Farms, a banana farm and beef cattle grazing.

In combination with Ulupono Initiative, Hawai‘i Dairy Farms, LLC (HDF) reflects a viable approach to apply use of Important Agricultural Lands to agricultural self-sufficiency and food production. HDF represents a continued commitment by the landowner to support farming and local food production, and to aid in the resurrection of Hawai‘i’s dairy industry.

Figure 2.2-1 State Land Use Districts and Important Agricultural Lands on Kaua‘i
2.3 PURPOSE AND NEED FOR THE HAWAI’I DAIRY FARMS PROJECT

2.3.1 PROJECT PURPOSE

The project purpose is to establish a sustainable, pastoral rotational-grazing dairy farm that will increase current local milk production, bolster Hawai‘i’s declining dairy industry, and reduce reliance on imported milk from the mainland United States. The rotational-grazing dairy system utilizes 100 percent of all manure on-site as natural fertilizer to grow grass. This cost-effective method reduces imported fertilizer and feed, and minimizes potential impacts to the environment.

2.3.2 PROJECT NEED

Currently, residents and visitors to Hawai‘i rely on air- and ship-freight for 90 percent of goods, including food. Food sustainability is of growing interest to residents, especially those who have experienced low available supplies when faced with natural disasters, labor disputes that affect shipping ports, and geopolitical events such as 9-11. With the departure of large sugar and pineapple plantations from Hawai‘i, more lands are available for diversified agricultural endeavors. A 2008 study identified the economic benefits of replacing 10 percent of imported food with locally produced food as generating an estimated Hawai‘i economy-wide impact of $188 million in indirect sales, $47 million in earnings, $6 million in state tax revenues, and more than 2,300 jobs (CTAHR, 2008). Additionally, there is a desire to retain Hawai‘i’s agricultural history and the open landscapes associated with ranging and farming.

Between 1984 and 2015, importation of milk to Hawai‘i rose from 0 to 90 percent. The local dairy industry has been reduced to just two dairies on the Big Island, and with a recent cut in price paid to those dairies of 23 percent by the processor, local milk production is in jeopardy. Conventional feedlot dairy operations face management challenges including costs of imported feed which fluctuate with grain and fuel prices, and the need to store manure in waste impoundment lagoons as a waste product. Without a need to utilize manure as a nutrient for growing crops, options for utilizing manure produced are limited to drying manure for sale, spreading on lands that can tolerate the nutrients, utilizing dried manure solids as bedding for dairy cows in confinement, or generating energy, which ultimately requires treatment and disposal. The pastoral-based dairy utilizes a system to balance needs of the forage (grass) with nutrients provided by manure produced on site.

2.3.3 PROJECT OBJECTIVES

Hawai‘i Dairy Farms set eight objectives to achieve to bolster local milk production in Hawai‘i:

1. Provide more than 1,000,000 gallons annually of fresh, nutritious milk for Hawai‘i families and revitalize the dairy industry in Hawai‘i.
2. Apply proven, sustainable pasture-based rotational grazing system and state-of-the-art technology to reduce reliance on costly imported fertilizer and feed.
3. Grow local, quality grass as a primary feedstock optimal for dairy cow nutrition and health, utilizing results of forage research conducted at five sites across four Hawaiian Islands.
4. Design facilities to provide animal comfort, including maximum time on pasture and minimal milking time.
5. Effectively integrate dairy operations within the island community setting.
6. Optimize dairy product shipping and marketing.
7. Provide local farming employment and build the agricultural economy.
8. Protect and enhance the area’s natural, cultural, social and economic environment through sound agricultural planning, preservation of open space and protection of sensitive resources, and development of economic benefit.

2.3.4 EVALUATION CRITERIA

Within the context of the HDF objectives, primary evaluation criteria have been established which must be satisfied for the project to be economically, socially and environmentally responsible. The four evaluation criteria are:

1. Secure sufficient contiguous land area under long-term lease with adequate water supply (including potable water to meet standards under milk rules), suitable soil properties, gentle slope conditions, and road accessibility.

2. Generate new long-term employment in the agricultural sector on Kaua’i in a wide range of positions including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk products processing and dairy business management.

3. Create a model for dairy operations utilizing IAL, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure to advance food self-sufficiency.

4. Utilize 100 percent of manure on site as nutrients to grow forage for dairy cows. Grow sufficient forage to provide 70 to 85 percent of feedstock required for the herd.

Hawai’i Dairy Farms has been designed to meet the guiding objectives. The project represents a directed effort to establish a pasture-based dairy in Hawai’i that will lead to improving food security for Hawai’i. The model uses a pastoral rotational-grazing system on former sugarcane plantation lands. With the demonstrated success of Hawai’i Dairy Farms, the proponents will be able to continue and expand their community leadership and social investment within Hawai’i by adapting the grazing system to other locations in the state. These objectives and criteria are the guiding parameters that ultimately define the direction for Hawai’i Dairy Farms. As discussed in Section 6.0, these evaluation criteria are applied to evaluate and compare probable impacts of the Proposed Action with alternative actions.

2.4 PLANNED DAIRY DEVELOPMENT ON MĀHĀʻULEPŪ AGRICULTURAL LANDS

A partnership of landowners and supporters throughout the state worked to determine optimal sites for Hawai’i’s first pasture-based dairy. The group sought an approach to dairy farming reliant on local forage and nutrient recycling, rather than the conventional feed lot dairies. After significant research and inquiry, New Zealand’s grass-fed model was found to be the cleanest, most cost-effective method for sustainable dairy production in Hawai’i.

From 2010 to 2011, Grove Farm partnered with Finistere Ventures, Kamehameha Schools, Maui Land & Pineapple and Ulupono Initiative to conduct grass trials statewide and determine the best
site for a rotational pasture-based dairy. Kaua‘i was found to be the optimal location. Operational needs for a pasture-based dairy include:

- Relatively flat, contiguous acres to move cows with minimal stress,
- Soils suitable to efficiently utilize applied nutrients for growth of forage,
- Adequate water for irrigation and operations,
- Suitable climate conditions for animals and grass growth,
- Agricultural-zoned land available for 20 years or more of sufficient acreage to support an economically viable dairy, preferably IAL, and
- Access to required operational support elements (trucking, pasteurization, work force, etc.).

In late 2013, Ulupono Initiative made the investment to fund Hawai‘i Dairy Farms, the first pasture-based, rotational-grazing dairy in the state. HDF was formed as a positive step toward the island state’s food security, economic diversity, and sustainability. At steady-state production with 699 milking cows, the farm will produce roughly 1.2 million gallons annually at market price. Increasing fresh milk by approximately 10 percent of current supply using cows in Hawai‘i will reduce reliance on imported milk from the mainland U.S. HDF operations will be based on the most successful island dairy models in the world, and will utilize a sustainable, pasture-based rotational grazing system and 21st century technology. The farm will be very different from conventional feedlot dairy operations of Hawai‘i’s past.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. The application process for a National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) permit includes public notification and input. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

Chapter 3 describes details of the proposed project, known as the “Proposed Action”. Chapter 4 analyzes probable impacts to the environmental and socio-economic resources from the Proposed Action. Chapter 5 provides regulatory context relevant to the proposed land use and agricultural operations. Alternatives to the Proposed Action that were considered, and an analysis of potential impacts, are presented in Chapter 6.
Figure 2.4-1 Project Location on Māhā‘ulepū Agricultural Lands
3.0

DESCRIPTION OF THE PROPOSED ACTION
3.0 DESCRIPTION OF THE PROPOSED ACTION

The project will reinvigorate the flagging dairy industry in Hawai‘i and establish a financially and environmentally sustainable, pastoral rotational-grazing dairy to provide more than 1,000,000 gallons of fresh milk for Hawai‘i’s families. This section describes the proposed action within the agricultural context of the Māhā'ulepū site. Individual improvements composing the Hawai‘i Dairy Farms project are detailed in this chapter, with site plans where relevant.
3.1 SITE DESCRIPTION: HISTORY AND VISION

HDF leases agricultural land in Māhāʻulepū Valley on the south shore of Kaua‘i (see previous chapter, Figure 2.4-1 Project Location Map, and Figure 3.1-1). The 557-acre site consists of portions of three parcels leased from Mahaulepu Farm LLC (Figure 3.1-2 Tax Map Key). The lease area was surveyed for a metes and bounds description, which modified the acreage from an originally estimated 578-acres to the surveyed 557-acres to allow for access around the perimeter, fencing setbacks, buffers from cultural sites above the farm, and for potential future expansion of the taro farm by the lease-holder.

Māhāʻulepū Valley lies on the leeward side of the Hāʻupu mountain ridge, a prominent feature of southern Kaua‘i, where Mt. Hāʻupu forms the highest point at 2,297-feet elevation in the back of the valley. Māhāʻulepū has a long history of agricultural use. Prior to European contact, the valley was occupied by Hawaiians who cultivated traditional food crops such as kalo (taro) and kō (sugarcane). During the transition of land tenure following arrival of Europeans and the rule of King Kamehameha III, Māhāʻulepū Valley became the first place in the island chain where sugarcane was commercially grown.

As early as 1820, sugarcane was milled in Māhāʻulepū for local use; commercial-scale operation was underway in 1878 as Kōloa Plantation and occupied roughly 875 acres in Māhāʻulepū Valley (Figure 3.1-3). Cultivation continued under various entities until 1996 when the Kōloa Mill closed. In historic times, cattle occasionally foraged on the slopes above the valley. Grove Farm Company, Incorporated (Grove Farm) leased a portion of the Māhāʻulepū area to ranchers as early as 1986, with portions of the valley floor grazed by cattle from 2002 to 2013. Approximately 400 – 500 head of beef cattle were shifted off the valley floor to surrounding properties upon HDF’s lease. Taro cultivation was introduced on an adjacent parcel in 2007 when landowner Grove Farm offered small parcels with access to water to individual farmers in an effort to establish an agricultural park of varied users. The land was originally owned by Grove Farm and Visionary, LLC (Lihue Land Company) and transferred to Mahaulepu Farm LLC in 2011.

The nearest populated area to Māhāʻulepū Valley is the Kōloa town community; residences closest to the site are 2.3 miles west. Kōloa town has its roots firmly tied to the agricultural history of the region. The resort area of Po‘ipū began with oceanfront resort hotel development in the 1960s. During the 1970s and 1980s, agricultural lands in the Po‘ipū area were reclassified from State Agricultural District to Urban District, and rezoned by the County as resort. The Grand Hyatt Kaua‘i is the closest resort to the dairy site, with 1.6 miles between the property boundaries. Significant expansion along this coastline occurred from 1980 to present, with active development of hotels, timeshare condominiums, single-family resort residences, golf courses and commercial centers.

Community concern over loss of agricultural land for another proposed resort on the last stretch of undeveloped Māhāʻulepū coastline prompted the County Council and State Legislature to pass resolutions supporting future preservation of the Māhāʻulepū ahupua’a. The 2000 Kaua‘i General Plan recommended community involvement in planning for the future of Māhāʻulepū to take into consideration various interests and factors to include: the long-term need to manage lands for preservation of significant natural and cultural features; the landowner’s desire to develop revenue-producing uses that are sensitive to the area’s unique qualities; the need to secure permanent public access to the shoreline; and the potential to create a coastal park (COK, 2000). Grove Farm Company, Inc., testified in response to a State resolution for re-assertion of its rights to plan for its own lands and expressed concern that development of a park or public use of Māhāʻulepū would support a takings action for government ownership. Grove Farm has continued to allow public access and use of Māhāʻulepū lands at its expense.
Figure 3.1-1  Project Area
Figure 3.1-2  Tax Map Key for Project Area
In 2011 the landowner petitioned for, and the State Land Use Commission designated, 1,533 acres in the Māhāʻulepū region as Important Agricultural Lands (IAL) under the provision of the Hawaiʻi State Constitution (Article XI, Section 3). This constitutional requirement is for conservation and protection of agricultural lands, promotion of diversified agriculture, and increased agricultural self-sufficiency. The IAL designation assures available lands suitable to support a diversity of agricultural activities and opportunities to expand agricultural income and job opportunities. The designation includes the 557 acres leased by HDF (See previous chapter, Figure 2.2-1).

HDF will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhāʻulepū Valley on the island of Kauaʻi to produce fresh, locally available nutritious milk for Hawaiʻi families. The rotational-grazing method utilizes 100 percent of the cows’ manure as fertilizer for pasture grass to provide the primary source of nutrition. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will provide a local food source appropriate for cow health and quality milk production, and will comprise at least 70 percent of the animals’ diet.

HDF has committed to establish a herd of up to 699 mature dairy cows. As explained in Section 2.4, HDF may contemplate possible expansion of the herd following proven success of the rotational-grazing system for local milk production. While additional regulatory review and public input would be required at that time, this Environmental Impact Statement (EIS) documents potential impacts from both herd sizes for comparative purposes and full disclosure. Differences in infrastructure or operations for the two herd sizes are noted, where applicable.
3.2 CONSERVATION PRACTICES

In 1935, the U.S. Congress directed the creation of the Soil Conservation Service in response to drought and wide-scale soil erosion in the mid-western U.S. known as the “Dust Bowl”. Erosion of soil was recognized as having an impact on the Nation and rural communities. The Soil Conservation Service became the Natural Resources Conservation Service (NRCS) in 1994 to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices.

Conservation planning under NRCS emphasizes desired future conditions while improving the conditions of natural resources. Participation is voluntary for private projects on private lands that do not use federal funds. NRCS employees work with local conservation districts to establish objectives that reflect resource issues and priorities of the district (NRCS, 2013). The NRCS approach combines locally-led solutions with science and research, stewardship, partnerships, and proven conservation practices. Technical guidance is available through NRCS handbooks, input from NRCS conservationists, certified technical service providers (TSP), and the local soil and water conservation district.

In Hawai‘i, soil and water conservation districts are legally constituted self-governing sub-units of the Hawai‘i state government organized under the 1947 Hawai‘i Soil and Water Conservation District Law. Hawai‘i Revised Statutes Chapter 180, as amended, outlines the duties and powers of the SWCDs to administer and conduct soil and water conservation activities within the State of Hawai‘i. Since 1967, the Hawai‘i State Department of Land and Natural Resources (DLNR) has provided funding and administrative support (SWCD, 2016). The East and West Kaua‘i Soil and Water Conservation Districts were founded in 1953. As with the other districts in the state and across the nation, the districts are locally led grassroots organization guided by unpaid volunteers who contribute their time and effort, with support from conservation partners, to preserve natural resources and enhance the quality of life in their communities (E&WKSWCD, 2015).

Hawai‘i Dairy Farms has engaged with the NRCS resource conservationist to seek technical guidance, including consultation with a technical service provider (TSP). A Conservation Plan for the project, which includes a Comprehensive Nutrient Management Plan, was reviewed and accepted by West Kaua‘i Soil and Water Conservation District. Conservation planning is a process that recognizes the art and science of natural resource management will never be complete or finished. As conditions and knowledge of the resources change, the methods to achieve natural resource and agricultural goals may be modified. On-going dialogue and guidance based on observations in the field are anticipated throughout project implementation and establishment.

NRCS has set a standard for numerous conservation practices which are known as practice standards and practice codes. Planning for both HDF implementation and future operations incorporates these practice standards and codes. Where the standards and codes have been customized for Hawai‘i and other Pacific Island environments by the local NRCS Pacific Islands Area office, the ‘PI’ standard or code was followed. Table 3.2-1 documents the Practice Codes utilized in the HDF project.
Table 3.2-1  NRCS Conservation Practices to be Utilized at HDF

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Code Name</th>
<th>Code No.</th>
<th>Code Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>102/104</td>
<td>Comprehensive Nutrient Management Plan</td>
<td>517</td>
<td>Animal Trails and Walkways (Raceways)</td>
</tr>
<tr>
<td>313</td>
<td>Waste Storage Facility</td>
<td>521A</td>
<td>Pond Sealing or Lining, Flexible Membrane</td>
</tr>
<tr>
<td>316</td>
<td>Animal Mortality</td>
<td>533</td>
<td>Pumping Plant</td>
</tr>
<tr>
<td>350</td>
<td>Sediment Basin</td>
<td>558</td>
<td>Roof Runoff Structure</td>
</tr>
<tr>
<td>380</td>
<td>Windbreak/Shelterbelt Establishment</td>
<td>560</td>
<td>Access Road</td>
</tr>
<tr>
<td>382</td>
<td>Fencing</td>
<td>561</td>
<td>Heavy Use Area Protection</td>
</tr>
<tr>
<td>412</td>
<td>Grassed Waterway</td>
<td>578</td>
<td>Stream Crossings</td>
</tr>
<tr>
<td>430</td>
<td>Irrigation Pipeline</td>
<td>590</td>
<td>Nutrient Management</td>
</tr>
<tr>
<td>442</td>
<td>Irrigation System, Sprinkler</td>
<td>614</td>
<td>Watering Facility</td>
</tr>
<tr>
<td>512</td>
<td>Forage and Biomass Planting</td>
<td>620</td>
<td>Underground Outlet</td>
</tr>
<tr>
<td>516</td>
<td>Pipeline</td>
<td>634</td>
<td>Waste Transfer</td>
</tr>
</tbody>
</table>

Additional relevant Practice Codes may be utilized.

Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices, including but not limited to those shown above, are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

3.3 DAIRY SITE REQUIREMENTS AND LAYOUT

Operational needs for a pasture-based dairy are listed in Section 2.4. Two additional operational needs - suitable climate and soil - are discussed in Chapter 4. The following section expands upon the elements of the Māhāʻulepū site that fit the following needs:

- relatively flat, contiguous acreage;
- adequate water for irrigation and operations;
- agricultural-zoned land available for 20 years or more with sufficient acreage to support an economically viable dairy (preferably utilizing Important Agricultural Lands - IAL); and
- access to support elements (trucking, pasteurization, and work force).

A pasture-based dairy requires relatively flat, contiguous acreage. Gentle slopes allow dairy cows to conserve energy moving between paddocks and the milking parlor twice each day. The Māhāʻulepū site ranges from 0-10 percent slope, with steeper areas along the agricultural ditches created for irrigation during the sugarcane plantation era. Minimal stones in the pastures and along the raceways provide for hoof comfort and protect against injury and lameness. The predominant soils are suitable for establishment of nutritious grasses and nutrient application (See Sect. 3.5 and 4.3).

The 557-acre site consists of 547 acres for paddocks, vegetated buffers (“setbacks”) along drainage ways, farm roads, and cow races. The dairy buildings and supporting infrastructure, holding yards and roads occupy the remaining 10-acre area, located on the western boundary of the site (Table 3.3-1 and Figure 3.3-1).
Figure 3.3-1  Dairy Facility Site Plan
Table 3.3-1  Land Use Summary

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy Buildings, Yard, Sheds, Road, Ponds</td>
<td>9.7</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>9.7</strong></td>
</tr>
<tr>
<td>Paddocks</td>
<td>469.9</td>
</tr>
<tr>
<td>Cow Races, Farm Roads, Drainage Ways &amp; Setbacks / Vegetated Buffers</td>
<td>77.2</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>547.1</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>556.8</strong></td>
</tr>
</tbody>
</table>

3.3.1 BUILDINGS

The developed area “footprint” would occupy less than two percent of the total farm area. Four buildings would be constructed to serve different functions, supported by utilities and infrastructure.

Utilities needed for the dairy facilities include a potable water distribution system from the private on-site well, one domestic individual wastewater system (IWS, a DOH-approved septic system) for the employee restroom, and utility-provided electrical power and communications. Agricultural infrastructure components are discussed in Section 3.3.2.

3.3.1.1 Milking Parlor

The largest building designed for the dairy is known as the milking parlor. Components of the building, approximately 256-feet long by 88.5-feet wide and 33-feet tall, include a covered loading area, milking area, holding pens, mechanical room and pump room, office space, veterinary space and storage, staff restrooms, and milk storage.

The milking area contains an automated 60-stall rotary, which utilizes a slowly turning platform. A dairy employee will place a milking machine on the udder; the machine disengages when no milk is detected. Cows are eager to enter the rotary where they are provided a mixture of grain and supplemental nutrients, which would initially constitute approximately 30 percent of their dietary needs. The grain mixture complements the main diet of grass and provides supplemental nutrients to support cow health and milk production. The supplemental grain feed would be stored in two 44-ton capacity, 60-degree cone silos. The milking parlor would operate 365 days a year. Typical milking time is 8 to 10 minutes; the time moving between the paddocks and milking parlor is approximately one hour per session, for a total of two hours off pasture each day.

3.3.1.2 Implement Shed

An implement shed would be used to store equipment, tools, and supplies, and to provide space for farm machinery. Sized at approximately 65-feet long by 26-feet wide by 15-feet tall, the implement shed will be an open bay steel structure on a concrete slab with a metal roof. Refer to Figure 3.3-1, Dairy Facilities Site Plan.
3.3.1.3 Calf Sheds

The calf sheds are steel-framed structures with metal roofs anchored to foundation on an underlying concrete slab. Each of the two sheds will be approximately 81-feet long by 26-feet wide, and 15-feet tall (Figure 3.3-3). To allow for the natural social behavior of calves and provide room for them to turn comfortably and lie down, 20 calves share a pen. The pens are sized to allot roughly 21 square feet per calf, and are divided into a feeding area and a bedding area. Newborn calves are kept in individual protective “crates” within the calf shed for the first 10 days to ensure successful feeding and to provide individual monitoring and attention. At approximately 10 days of age, calves are moved to pens with other calves until they are ready to transition to pasture at about 3 to 4 weeks of age. The feeding area is washed daily, with wash water routed to the effluent ponds through under surface pipes (see Agricultural Infrastructure section, following). With freedom to move about, calves typically will not soil their bedding while at rest; any manure will be removed as needed.
3.3.1.4 Holding Yard

Cows waiting to enter the milking parlor will move through the holding area as a mob, twice each day. The yard is designed to hold a mob of up to 330 cows at any one time. The committed herd size of 699 mature dairy cows will be managed in mobs of 105 to 115 cows. A mob is a group of cows that mimics the natural social order of bovines and is managed together. The yard is approximately 12,300 square feet (150-feet long by 82-feet wide); half of the area will be covered with roofing (Figure 3.3-4 Dairy Facility Detail). The maximum time off pasture for each milking – including moving from the paddock, through the holding yard and milking parlor, and back to a fresh paddock – will be one-hour per milking, two times each day.

![Figure 3.3-4 Dairy Facility Detail](image)

3.3.1.5 Effluent Ponds

Manure will be washed from the yard frequently to provide a healthy environment for the cows. Washdown water containing manure and urine will be collected and transferred to the settling pond through underground pipes. The collected effluent will be utilized as natural fertilizer to provide nutrients for pasture grass (see Section 3.5.4, Irrigation and Nutrient Balance).

3.3.1.6 Access Road and Tanker Truck Turnaround

Primary access to the dairy facility will be from the existing farm road in the center of the site, via a newly paved 20-foot wide road. Milk tanker trucks will utilize the access road to load milk and to transport milk off-site. The paved road will terminate at a truck turnaround by the covered loading area of the milking parlor, where raw, cooled milk will be pumped directly into insulated tanker trucks from the loading area for transport off-site (Figure 3.3-1 Dairy Facility Site Plan).
Utilities will be installed to provide electrical power, potable water, domestic wastewater, drainage and communications within the buildings and facilities in the area of the milking parlor, as described in this section.

**Electrical Power**

Electrical power will be provided through an overhead service connection to the existing Kaua‘i Island Utility Cooperative (KIUC) grid. An existing overhead line along the farm road mauka of the facility will feed to a new three-phase, 75-300 kVA transformer via a subgrade duct bank. Electrical lines to the dairy facilities will be run in a concrete-encased conduit routed underneath the access road. Additional power will be supplied by photovoltaic (PV) panels mounted to structure roofs, with a total generation capacity of 500 kW power.

**Potable water**

Potable water is required for milk cooling, livestock consumption, and consumption within the dairy facility, as well as to supply wash water to maintain animal health and sanitation of the milking parlor, holding yards and calf sheds. State of Hawai‘i Department of Health (DOH) Milk Rules require potable water used for milk production – in the milking parlor and for milking operations - be from an approved supply that is properly located, protected, and operated in a sanitary manner.

Potable water will be sourced from the existing Māhāʻulepū Well Battery located within the project site. The well site originally contained up to 14 wells, the first ten of which were drilled by the sugar plantation between 1897 and 1901 (TNWRE, 2016). The final four wells were drilled during a modification of the well battery in 1927 to 1928. Of the 14 wells, only 3 were deemed sufficient and available for use by HDF. One well will be used for potable water, a second will be used for groundwater monitoring, and the third will be available for backup if needed. The well water has been tested and is of acceptable quality to meet the DOH Milk Rules.

Water will be stored in lined water storage tanks with a total capacity of approximately 80,000 gallons located outside the milking parlor’s southwest corner. From the storage tanks, water will be distributed into the milking parlor and to adjacent buildings for use. Water from the tanks will be used for both milk parlor and yards, as well as delivered to the paddocks to supply water for the herd (livestock water is discussed in Section 3.3.2, Agricultural Infrastructure). Small booster pumps will be used to deliver the required flow throughout the farm.

Within the milking parlor, potable water is primarily used to cool milk and to maintain sanitation. Water is used to flush out the milking equipment, as well as to wash manure and urine into the effluent ponds from the holding areas, milking parlor, and calf sheds. Sanitation facilities for dairy employees include restroom and hand-washing facilities, including hot and cold running water dispensed through a mixing valve and faucet.

Demand for potable water in the milking parlor facility is estimated to be approximately 12,165 gallons per day (gpd) for human consumption and wash water, and 17,475 for livestock consumption (at 25 gpd per cow per day). Total demand will initially be approximately 30,000 gpd with the committed herd size of 699 mature dairy cows. The potable water demand for the contemplated possible herd expansion up to 2,000 mature dairy cows is shown in Section 3.8.1.
**Domestic Wastewater**
Wastewater from a restroom planned for dairy personnel will be serviced by an individual wastewater system (IWS). An IWS treats wastewater on-site using DOH-approved systems (e.g. septic tank). The system will be designed for a flow of 700 gpd, with a 1,500-gallon capacity septic tank certified by the International Association of Plumbing and Mechanical Officials. The IWS septic tank system will be underground, outside and just south of the milking parlor.

**Communications**
Telephone and internet service will be provided through an overhead service connection via drop pole to the same subgrade trench as the electrical power, in a separate duct conduit that feeds into a 2’-0” by 4’-0” Hawaiian Telecom pull box. Communication lines will extend from the pull box to the dairy facilities via subgrade concrete encased conduit.

**Stormwater Run-Off/Drainage**
Gutters, curbs and swales will be used within the dairy facility to direct surface sheet flow as a part of the overall site stormwater management plan. Metal roofing material on dairy buildings will be sloped to adequately sized gutters and downspouts. Roof run-off from the implement shed, milking parlor, and covered section of the holding yard will be discharged at ground level directly to grass surrounding the buildings. Run-off from a 1.75-acre area within the facility, primarily uncovered areas with potential of manure, will be routed to the storage ponds. This area includes the loading area, the uncovered part of the holding yard, and the area immediately surrounding the effluent ponds. The pond edge will be above grade to prevent run-off from outside areas from entering the ponds.

Stormwater run-off from the calving shed roofs will discharge at ground level and be collected with the potentially contaminated runoff from the uncovered areas and directed to the storage ponds.

### 3.3.2 AGRICULTURAL INFRASTRUCTURE

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Section 3.5, Pasture Management.

#### 3.3.2.1 Storage Tanks and Silos

Milk storage tanks will be erected in the “milk room” within the milking parlor. The tanks maintain milk at the regulated temperature until transferred to a tanker truck. The milk room is located just inside the covered loading bay.

Potable water will be stored in two tanks described in the previous section under Utilities. The tanks are located outside the southwest corner of the milking parlor. Feed is stored in two cone silos outside the south side of the milking parlor, as explained in Section 3.3.2. Feed is lifted from the delivery pit via a grainleg and dispensed into troughs accessible by cows in the 60-stall rotary while milking. The silos are sited on a concrete pad.

Gasoline and diesel fuels will be stored in above-ground tanks. Fuels will be used in farm equipment, and will be available if needed to power an emergency back-up generator. Storage and inventory procedures for fuels and other petroleum products utilized at the dairy are described in Chapter 4, Section 4.13 Hazardous Substances.
3.3.2.2 Livestock Water Distribution System

Availability of drinking water has an impact on animal health and milk production. The livestock water distribution system has been designed to supply a large volume of water to meet the seasonal high daily water demand of 25 gpd per cow. Potable water will be pumped from the Māhā'ulepū Well 14 and stored near the milking parlor in two covered storage tanks with combined capacity of 80,000 gallons. Small diameter water mains will deliver water to at least two troughs in each paddock. Troughs will be filled with valves that allow water flow when the water level decreases, and to stop water flow when the trough is full. The raised, concrete troughs will be placed on a stable crushed rock base at a height that allows cows to reach over and into the water, but discourages stepping into the trough.

The total potable water demand for HDF is documented in Chapter 4, Sections 4.16.2 and 4.23.1.

3.3.2.3 Drainage Improvements

Drainage improvements will consist of surface modifications to include swales (referred to as grassed waterway in NRCS Practice Codes), sediment basins, stream crossings, surface drainages, and water and sediment control basin. Much of the existing drainage infrastructure, installed and used for sugarcane irrigation, will be restored where possible and reused or improved.

3.3.2.4 Effluent Storage Ponds

The pasture-based system utilizes manure as a valuable resource. This is a fundamental difference and advantage over conventional feedlot dairy operations, which have insufficient land to recycle the nutrients for uptake by forage plants and instead rely on imported feed and large storage lagoons to hold manure. The pasture-based dairy relies on 100 percent of the nutrients from manure deposited on the pasture, with application of manure captured in the effluent ponds, to grow the majority of forage for the herd.

Collection and storage of effluent provide a tool for the dairy manager to control the schedule, timing, and mix of nutrients to be applied. Sizing of the storage facility allows flexibility in scheduling land application when weather and field conditions are suitable, and when nutrients in the effluent can best be used. The storage period is determined by the utilization schedule. The ponds for HDF will be sized to accommodate the potential maximum effluent generated from the contemplated herd size of up to 2,000 mature dairy cows. For the committed herd size of 699 mature dairy cows, the ponds will have excess capacity.

Siting, design and construction of the ponds will be in compliance with the University of Hawai‘i College of Tropical Agriculture and Human Resources (CTAHR) and technical guidance from NRCS. The Livestock Waste Management Guidelines (U.H., 2010) requires storage facilities for animal wastes should provide a minimum buffer of 1,000 feet from public drinking water resources, and 50-feet from surface water resources. At their closest points, the ponds will be sited approximately 125 feet from the nearest drainage ditch, and 3,420 feet from the nearest public drinking water well (Figure 3.3-5). Design guidance for effluent storage requires sizing of the pond to contain all wastewater, manure, clean water, solids accumulation, net surface rainfall including runoff, and the direct precipitation sized for a 25-year, 24-hour rainfall event.
Figure 3.3-5  Effluent Pond Siting
Wash water from the milking parlor will be routed to the settling pond through a pipe. Run-off from the dairy facility will be managed as described in Section 3.3.1.7 (Stormwater Run-Off/Drainage). The U.H. Waste Management Guidelines (2010) require waste lagoons to be lined with a synthetic liner if within 1,000 feet of a public drinking water source, or within 50 feet from surface water resources and/or State waters.

While the ponds’ distances from water resources exceed U.H. Waste Management Guidelines (2010) thresholds to require lining with synthetic liner, HDF has elected to line the ponds to protect against seepage into surrounding soil. The synthetic liner will meet the standards of the NRCS Conservation Practice Code, and will be underlain with a sensor system that can detect moisture and alert personnel to potential leaks. Inlets, outlets, ramps and other elements of the effluent transfer system will be installed according to NRCS practices to prevent damage to the operation of the liner. Volumes, assumptions and additional description of the pond system can be found in Appendix D, Nutrient Balance Analysis.

The two-pond system for HDF will be composed of a settling pond and a storage pond. Daily generation of effluent with wash water entering the ponds has been calculated to be 13,226 gallons per day (gpd) for the committed herd size of 699 mature dairy cows. Roughly 1 percent of the daily effluent consists of solids, with approximately 5,952 gallons of solids accumulating over a 45-day storage period (Table 3.3-2). Storage calculations for the contemplated future possible herd size of up to 2,000 mature dairy cows are shown in Section 3.8.1.

<table>
<thead>
<tr>
<th>Design Criteria/Assumption</th>
<th>699 Mature Dairy Cows</th>
<th>Pond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Effluent Generation</td>
<td>13,225.8 gpd</td>
<td></td>
</tr>
<tr>
<td>Percentage of Solids</td>
<td>1%</td>
<td>Settling</td>
</tr>
<tr>
<td>Volume of Accumulated Solids for 45-day Period Between Application</td>
<td>5,951.6 gal.</td>
<td>Settling</td>
</tr>
<tr>
<td>Daily Effluent Flow to Storage Pond</td>
<td>13,225.8 gpd</td>
<td></td>
</tr>
<tr>
<td>Minimum Volume of Effluent Storage for 30-day Design Volume Period</td>
<td>396,774.0 gal.</td>
<td>Storage</td>
</tr>
<tr>
<td>Depth of 25-Year, 24 Hour Storm</td>
<td>10.4 inches</td>
<td>Storage</td>
</tr>
<tr>
<td>Depth of 30-day Design Volume for Normal Precipitation</td>
<td>6.0 inches</td>
<td>Storage</td>
</tr>
</tbody>
</table>

Solids are retained in the settling pond through filters. The volume of the settling pond allows space for stirring to re-suspend solids for application to pastures, which provides an additional 285,241 gallons of pond capacity (Figure 3.3-6). Solids will be cycled through the pond onto the paddocks over a period of approximately 45 days (see Section 3.5.4, Irrigation and Nutrient Balance).

The storage pond is sized to hold a volume equivalent to 30 days of effluent from the contemplated herd size of up to 2,000 mature dairy cows, plus normal precipitation and run-off for a 30-day period from the 1.75-acre, uncovered portion of the total facility area to receive manure and wash water, plus the possible rainfall from a 25-year, 24-hour storm event (Figure 3.3-6). While precipitation over these areas is directed to the storage ponds via drain inlets and piping because it
will be mixed with manure and wash water, other precipitation from remaining areas of the facility and adjacent pasture will not enter the pond, as the pond edges consist of raised berms. Grading around the facility will direct uncontaminated rainfall away from the facility.

For the committed herd size of 699 mature dairy cows, the storage pond could accommodate nearly one million gallons more than the NRCS design requirements (Figure 3.3-6). In normal operations, the storage pond provides additional spare volume at the top of the pond. In the 699-cow scenario, the spare volume is an additional 45% of the total volume design. In the 2,000-cow scenario, the spare volume represents an additional buffer of up to 12%. These spare volumes provide even greater buffer above the design capacity which includes not only the required 25-year, 24 hour storm event, but also allows volume for 30 days of storage, and normal precipitation to the surfaces surrounding the ponds.

Figure 3.3-6  Effluent Pond Plan and Section for Committed Herd of 699 Mature Dairy Cows
Nonetheless, the storage pond design incorporates an emergency spillway to direct overflow to a secondary containment area in case of a cataclysmic event. This containment is beyond the regulatory requirement, and would only be utilized during an unprecedented rain or flood event. The capacity of the secondary containment is approximately 1,125,600 gallons, which is roughly equivalent to the total wastewater volume for a 30-day period from the potential contemplated herd size of up to 2,000 mature dairy cows.

Liquid effluent will be mixed with non-potable water from the Waita Reservoir and applied to pastures through a pivot irrigation system. The typical utilization schedule for the nutrient-laden water from the storage pond is every four days, depending on field conditions. Slurry will be applied through a mobile hard-hose reel dispensed through a gun nozzle, referred to as a gun irrigation system. Slurry refers to solids from the bottom of the settling pond mixed with non-potable water that can be applied through the gun irrigation system. The frequency and quantity of effluent applied depends on a variety of conditions discussed in Section 3.5.4, Irrigation and Nutrient Balance.

### 3.4 HERD MANAGEMENT

The management practices and pasture-based rotational grazing system to be applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows will be managed in social groups known as “mobs”, mimicking the natural social order of bovines. The committed herd size of 699 mature dairy cows will be organized in mobs of 105 to 115 cows. The pasture-based model allows cows to move about freely and to lie down and rest, which is an important part of the digestion cycle. Cows will spend 22 of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks and walkways will minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the milking facility; surfaces of the walkways and cow races will be topped with crushed limestone to provide a comfortable path under hoof. Cows tend to be healthier and live longer productive lives with access to fresh air, high quality feed, and exercise while they forage (NRCS, 2007).

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food and Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit the sale of milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

With the committed herd size, there will be approximately 150 calves on the HDF site at any one time. Approximately 50 calves would be housed within the calf sheds, with approximately 100 calves on pasture, grazing. The actual numbers will depend on the calves’ age, size and health status. Once the calves reach approximately 165 pounds or 90 days of age, they will be transferred to an offsite calf raising facility (see Sections 3.7 and 3.8.4, Offsite Herd Management).

Should animals die at the site, they will be buried at a designated area, following plans for carcass management as specified in the Waste Management Plan reviewed by DOH.
HDF will comply with the applicable State and Federal regulations related to the importation of livestock and livestock disease control. This includes importation requirements by the State of Hawai‘i Animal Industry Division pre-entry requirements such as testing for diseases such as brucellosis, and tuberculosis. The cows will also undergo approved external parasite prevention methods, and national uniform tagging or identification registration and processing.

3.5 PASTURE MANAGEMENT

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Pasture is defined by the Natural Resource Conservation Service (NRCS) as:

... a land use type having vegetation cover comprised primarily of introduced or enhanced native forage species that is used for livestock grazing. Pasture receives periodic renovation and cultural treatments such as tillage, fertilization, mowing, weed control, and may be irrigated. Pasture vegetation can consist of grasses, legumes, other forbs, shrubs or a mixture. Pasture differs from range in that it primarily produces vegetation that has initially been planted to provide preferred forage for grazing livestock. The majority of these forages are introduced, having originally come from areas in other continents. Most are now naturalized and are vital components of pasture based grazing systems (NRCS, 2016).

Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass. Additional project-specific trials at the Māhāʻulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.
Figure 3.5-1  Dairy Facility Site Plan
3.5.1 PADDOKS, FENCING AND SETBACKS

The 469.9 acres of pasture will be divided into 119 paddocks that average 3 to 5 acres in size (Figure 3.5-3 and Table 3.3-1). Smaller paddocks will be located near the dairy facility for use as temporary pasture for cows or calves being moved on or off the farm (see Section 3.7, Offsite Herd Management by Kaua'i Ranchers). To protect water quality of surface water and downstream areas, paddock fences are set 35 feet back from the top of bank of drainage ways in the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

As described in Section 3.3.2, a minimum of two concrete above-ground water troughs will be installed in each paddock for livestock drinking water.

Fencing is essential to containing cows for safety, protecting water quality, and optimizing animal and pasture health, milking output, grazing coverage, and nutrient distribution. A permanent perimeter fence will be constructed using steel t-posts installed every 10 feet, and a wooden post placed every 50 feet. The fence will include 42-inch woven wire topped with a strand of straight wire at 48-inch height, with a strand of barbed wire at ground level to deter feral pigs. Within the perimeter fence, paddock fencing will consist of two or three strands of electric wire mounted on wooden t-posts. Electric fencing is the standard material used for cows and cattle as it is effective and moved with relative ease to re-configure paddocks. T-posts are pounded into the earth using a hand-held pole pounder. Fence corners are strengthened through use of 6-inch diameter wood posts driven 2-feet into the ground using a mechanical pounder powered by a tractor hydraulics system. Gate posts made of steel pipe will be installed in holes approximately 12 inches across and 36 inches deep and set in concrete. The integrity of the fence is essential to project success, and will be diligently monitored and maintained by the dairy manager, who will be onsite daily.

3.5.2 COW WALKWAYS

Contiguous acreage is required for a pasture-based grazing system in which cows must walk to and from the milking parlor twice each day. Cow walkways are designed to conserve energy of the animals by utilizing gentle slope, and to minimize stress by allowing mobs to move at a relaxed pace. The walkways at HDF will be 16- to 20-feet wide, which allows the mob to walk as a group with their heads lowered. The walkways will be topped with crushed limestone that provides a soft surface to minimize hoof damage. The walkways will be elevated above the pasture grade, and in some areas will be parallel to farm roads. Surfaces will be slightly crowned to ensure drainage to either side of the walkway, and swales roughly 12-inches in depth will be created parallel to each road or raceway. Design and installation of roads, raceways, and swales will be in compliance with the HDF Conservation Plan and utilize standards from applicable NRCS Practice Codes.
3.5.3 FORAGE PRODUCTIVITY

Field trials of Kikuyu varieties conducted at the farm over the last 18 months are the basis for determining initial yields of pasture grass. The grass yields resulting from the field trials are anticipated to increase with full establishment of the dairy and maturation of the pastures. Cows on pasture aerate soils while foraging and deposit manure which, in turn, increases organic matter and carbon in the soil. These elements revitalize soil structure through improved microbial communities that assist with incorporation of manure nutrients into the soils, and convert them to a form readily available for plant uptake. Horticultural experts will continue to monitor grass yields during pasture establishment and as part of the ongoing dairy management. As a key piece of the overall nutrient balance, these data sets will help determine the ultimate potential carrying capacity of the farm.

Figure 3.5-2 Kikuyu Grass

Kikuyu and Guinea grasses brought in as cattle forage decades ago will be sown to transform the former sugar cane fields into pasture. The grass thatch will be built and initially maintained by frequent mowing. When the thatch is established, paddocks will be grazed for 8- to 12-hour periods during which cows leave manure behind to nourish soils and grass with a supply of natural nutrients. The dominant grass is Kikuyu (*Pennisetum clandestinum*), a high yielding species that can yield more than 20 tons (U.S.) dry matter per acre annually. In moist, tropical conditions with a year-round growing season, the grass has produced more than 35 tons of dry matter per acre per year.
Figure 3.5-3  Paddock Layout
As the cattle excrete on the Kikuyu thatch, nutrients are incorporated into what is effectively an organic net. Healthy soils contain primary decomposers such as earthworms and dung beetles that move manure into the soil profile when they burrow, aerating the soil to make organic materials accessible to secondary decomposers. Secondary decomposers include microbes (microorganisms) such as bacteria, protozoa, and fungi. The decomposition process breaks down manure into nutrient components that are readily available for uptake by the grass crop. In a healthy system, a manure pile can be removed from the soil surface within 24 hours. Even with the applied manure and effluent nutrients, the grass will need significant additional nutrients from conventional fertilizers to maintain optimum grass growth and yield goals with 699 mature dairy cows.

Kikuyu yield ranges between 4 tons (unfertilized) and 35 tons of dry matter (DM)/acre/year depending on fertilization levels. Kikuyu's response to fertilization is linear, and anticipated growth rates in Māhāʻulepū with irrigation are estimated to be some of the best in the world.

HDF coordinated the collection of Kikuyu grass samples beginning September 2, 2014. Kikuyu grass samples were collected at 18-day intervals between mowing and repeated after every fourth mowing. The intent was to simulate harvest of the grass by cows grazing on the paddock every 18 days, which allows for an 18-day rest period. A random grab sample method was used to replicate a cow grazing. Samples were collected every 5 steps while walking diagonally across the field. About 30 grabs were collected from each field and mixed to create a composite sample for the field. These samples were collected and dried at the same time as the production data samples and sent to Cumberland Valley Analytical services for wet chemistry and in vitro assay of forage quality. The trials were conducted in different locations on the farm for over a year across more than 75 acres of planted pasture.

Although the goal is for a 20-ton Kikuyu yield for mature pasture grass, the Kikuyu grass trials have averaged 16.3 tons of Dry Matter (DM) /acre/year which will initially be used as the basis for all nutrient application rates. The production of grass and realized yields is directly related to the nutrient application rates that can be utilized, as the grass relies on removal of natural or applied nutrients from the soils for growth. As the grass and pasture is established, yields are expected to increase, and removal of nutrients from the soil for uptake to the crop will increase.

Based on the Cumberland Valley Analytical results, the nutrient removal rates for Kikuyu in pounds removed per ton of Dry Matter (DM) which can be used in the nutrient mass balance analysis (see Section 3.5.4, Irrigation and Nutrient Balance) are as follows:

- **Lbs N removed per ton DM** = 64 lbs. N
- **Lbs P removed per ton DM** = 11.4 lbs. P
- **Lbs K removed per ton DM** = 90 lbs. K

While the crop growing season in Hawai‘i is year-round, trials have indicated that production of grass is lower during the winter months and higher during the summer months (16.3 tons of DM / acre/ year is an average). HDF expects to harvest, bale, and store extra grass crops during the summer months to supplement crop production and feed during the winter months to balance the availability of grass feed. Additionally, the grass yields resulting from the field trials are anticipated to increase with full establishment of the dairy and maturation of the pastures, a process which can take up to three years to reach optimal potential.
The NRCS Technical Service Provider working with HDF to develop the nutrient management plan, Red Barn Consulting, incorporated soil and agronomy information from technical consultants gathered at the Māhāʻulepū site (see Section 3.5.4, Irrigation and Nutrient Balance). The findings indicate a nutrient deficient soil regime, requiring supplemental commercial fertilizer for sustained pasture growth in addition to anticipated manure nutrients. The nutrient balance analysis shows that with the committed herd size of 699, supplemental commercial fertilizers will be needed to provide sufficient nutrients for continued soil health and grass productivity.

3.5.4 IRRIGATION AND NUTRIENT BALANCE

Irrigation is the primary method of applying natural fertilizer from the effluent ponds. This section discusses irrigation methods, setbacks, and determination of nutrient application rates.

3.5.4.1 Irrigation

The available pasture for grazing totals 469.9 acres. Of those acres, 346.5 acres will be irrigated with irrigation water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waita Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The pivot irrigation system utilizes two central pivots that feed water to an overhead, rotating sprayer supported by trusses mounted on wheeled towers that rotate in a 1,000-foot diameter. Nozzles are suspended several feet from the ground to direct water directly onto the pasture grass; the droplet size is large enough to reach the ground effectively without aerosolizing. Irrigation is not conducted during high winds.

The irrigation system will be controlled by a software system utilizing global positioning system (GPS) receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The rate at which irrigation water and/or diluted effluent will be applied can be varied by controlling pivot speed and water volume, depending on the actual irrigation needs of the farm. A somewhat typical application rate would include a 48-hour rotation and application of up to 0.39 inches of irrigation and/or diluted effluent onto the paddocks. Pivot crossings will consist of an elevated metal track anchored on both sides of the waterway to allow the pivot wheel to traverse ditches without impact.

Approximately 26.2% of the total pasture area will not be irrigated, primarily in the mauka areas of the farm where the pivots are unable to reach. No gun irrigation system will be used in this area. See Figure 3.5-5, Irrigation Map, for irrigated and non-irrigated areas. These areas will receive nutrient application as needed to maintain optimal grass growth; nutrient application is discussed in the following section.

Gun irrigators will be used to irrigate areas not covered by the pivots. The gun irrigators utilize a hard-hose reel, which can be moved throughout the farm as needed (Figure 3.5-4, Irrigated Pasture Area). Additional information on development of an irrigation system and irrigation management plan, including application methods, rates and schedules for irrigation are presented in Appendix D.

The GPS system within the pivots turns the irrigation and/or diluted effluent spray off within 50 feet on either side of a ditch, adhering to the best practice of not applying nutrients within the setback areas of waterways and ditches (see following section). Figure 3.5-4 illustrates the irrigation pivot system.
A separate rotating, hard-hose reel gun system will be utilized for application of solids from the settling pond as slurry, and is discussed in the following section – Nutrient Balance. This system will be completely separate from the gun irrigation system in the makai areas of the farm. A mixture of suspended solids, liquid effluent, and irrigation water will form the slurry mix, which will be pumped from the settling pond via underground piping to hydrants around the farm to which the hard-hose reel gun system connects.

The actual amount of applied irrigation and schedule of irrigation days will depend on the number of rain days and amount of precipitation. Therefore, irrigation demand is further examined on a monthly basis for operational purposes, based upon historical rainfall data, the pasture grass crop evapotranspiration (ET) rates, and average monthly precipitation. Effective precipitation is assumed to be up to 0.80 inches of the daily rainfall amount at the Māhā'ulepū Rain Gauge Station 941.1, with the assumption that rainfall greater than 0.80 inches is either lost to deep percolation into the soil or runoff, thereby reducing precipitation available to the crop (TNWRE, 2016).

Based upon the effective precipitation, demand estimates and methodology described in the Nutrient Balance Analysis (Appendix D), an Irrigation Water Management Plan, which will detail specific farm operating procedures, will be developed to provide the farm operator a plan for proper management and application of irrigation water to allow efficient use of water, minimize energy consumption, and maximize crop yield.
Figure 3.5-4  Irrigated Pasture Area
3.5.4.2 Nutrient Balance

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The NRCS Conservation Practice Standard 590 (referred to as Standard 590), Nutrient Management, is applied to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. The timing and application of nutrients should correspond as closely as practical with plant uptake, soil properties and weather conditions. The NRCS Standard 590 purpose, as reflected in a Nutrient Management Plan, is to:

- Budget, supply and conserve nutrients for plant production;
- To minimize agricultural nonpoint source pollution of surface and groundwater resources;
- To properly utilize manure or organic by-products as a plant nutrient source;
- To protect air quality by reducing odors, nitrogen emissions, and the formation of atmospheric particulates; and
- To maintain or improve the physical, chemical, and biological condition of soil.

A Technical Service Provider knowledgeable in NRCS Conservation Practices was retained to work with HDF technical advisors in determining a nutrient balance for the Māhāʻulepū site. Application of manure can be beneficial to soils by improving organic matter, increasing infiltration of water, and improving the soils’ ability to support pasture growth and root establishment.

The Nutrient Management Plan (NMP) developed for HDF includes the following required components:

1. An inventory of nutrient sources on the farm, including manure and crop residues.
2. Nutrient analyses of each of these sources.
3. A budget to supply and conserve nutrients for plant production
4. Soil tests to determine the nutrient needs of the crops to be grown.
5. Procedures for when and how to apply the manure to maximize crop benefit and minimize the environmental impacts of the nutrients.
7. Best Management Practices that minimize agricultural sources of pollution to surface and groundwater resources.
8. Procedures to monitor and maintain or improve the physical, chemical, and biological condition of the soil.

It is important to note that the NMP is an adaptive management tool. Sometimes described as a “living, breathing document,” the nutrient conditions are constantly monitored and the NMP will be updated as conditions on the dairy mature. The results from soil testing, manure testing, and forage testing will be utilized to update and inform the nutrient management process for HDF. Tests will be performed annually at a minimum, and more frequent as needed to assist with nutrient management on the farm.

Liquid effluent, containing vital nutrients for the Kikuyu crop growth that support and feed the mature dairy cows on pasture, will be applied through either of the two center pivots, providing a total application area of 285.1 acres. This represents the pasture area under the pivots, excluding access roads, cow raceways, dairy facility, and the 50-foot setback from drains/waterways. Priority
areas for nutrient application will be recently grazed paddocks that are in a regrowth period for approximately 18 days – a “rest” period for the paddocks, as the grass will require significant nutrient during its regrowth phase.

Soil moisture and the amount of precipitation will also determine the actual amount of both irrigation water and effluent to be applied in an application. Any deficit below field capacity determines the amount that can and may be applied. The frequency and number of heavy rain days will dictate the schedule of both irrigation water and effluent application. The maximum flow rate from the pump injecting the effluent from the storage pond is 320 gallons per minute (gpm). During the 48-hour cycle, roughly 0.12 inches of effluent water is applied via injection into the irrigation water to the center pivot, as part of the 0.39 inches of total irrigation per cycle.

The following liquid effluent setbacks are incorporated into the design to prevent application of effluent within the distance specified below:

- County Well Kōloʻa F – 1,000 feet on all sides (through County DOW agreement)
- Irrigation ditch, agricultural water, and natural water resource - 50 feet from top of bank of the water resource on both sides.
- Cow walkways and races - 6 feet on both sides
- Existing taro farm - 20 feet on all sides

The setback distances from water resources are based upon requirements contained within the “Guidelines for Livestock Waste Management”, by University of Hawai‘i Mānoa, College of Tropical Agriculture and Human Resources (CTAHR). While the minimum setback distance for the application of effluent from public drinking water sources is 50 feet per the Guidelines, HDF has agreed to increase this setback to 1,000 feet following consultation with the County of Kaua‘i Department of Water.

Based upon the areas served by each pivot, 0.54 MG of effluent can be applied by Pivot #1 and 0.39 MG of effluent can be applied by Pivot #2 per run. Each run lasts for a 48-hour cycle. These quantities are well below the irrigation demand of the crop for the 48-hour cycle during the spring, summer, and fall months. The storage pond effluent level will be lowered after each application cycle, as effluent applied by just one run of either pivot is greater than the daily effluent generation of 0.038 MGD at the contemplated herd size of up to 2,000 mature dairy cows.

When soils are saturated, irrigation and effluent application will be delayed until the soil structure can take additional water. Pond levels will be maintained at an operation level that allows capacity to store - in addition to capacity for the 25-year, 24-hour rainfall event - normal precipitation for up to 30 days, suspended solids and effluent from the contemplated herd size of up to 2,000 mature dairy cows, and slurry mixing volume. At 699 mature dairy cows, less effluent is produced allowing for even greater storage capacity and operational buffer. Each application of liquid effluent will be managed by area and volume, to ensure nutrients do not exceed crop demand.

Solids (mostly soft organic matter, but also some sand and mud, etc.), mixed with liquid effluent or irrigation water into a suspension, will be applied on designated areas, at a minimum of every 5 weeks (within 45 days), and it will be applied through a rotating gun system, utilized only for slurry. The slurry gun system is separate from the irrigation gun system used at the makai side of the farm. At 699 mature dairy cows, the area where the slurry will be applied is typically in non-irrigated areas, which are outside of the liquid effluent application area from the center pivot as
well as the gun irrigation system. At 2,000 mature dairy cows, slurry can be applied to non-irrigated areas, which are outside of the liquid effluent application area from the center pivot, as well as areas under the gun irrigation system. Management of the placement of slurry helps to ensure that nutrients or irrigation water are not excessively applied in any particular area, exceeding crop demand.

HDF anticipates slurry application more frequently than the maximum 45 day time frame, to manage effluent levels within the settling pond and reduce the overall volume utilized within the storage pond. If slurry is removed more frequently from the settling pond, more liquid effluent generated by the washdown of the dairy facility would be utilized in the settling pond’s mixing volume for slurry application in lieu of being collected in the storage pond and injected into the center pivots irrigation system, as the settling pond would be more frequently empty. This allows for additional buffer capacity in the storage pond system. Each application of slurry will be managed by area and volume, to ensure nutrients do not exceed crop demand.

Each application of nutrient, whether as-excreted manure from the cows on pasture, liquid effluent from the center pivots, or slurry application, must be managed by area and volume to ensure nutrients do not exceed crop demands. Such management is summarized in a nutrient mass balance analysis. Refer to Appendix D. An overview of Hawai’i Dairy Farm’s planned nutrient mass balance for 699 mature dairy cows is shown in the following table. The mass balance for the contemplated herd size is provided in Section 3.8.3.

<table>
<thead>
<tr>
<th>Nutrient Application</th>
<th>Area (acre)</th>
<th>Nitrogen Applied (lbs N/ year)</th>
<th>Phosphorus Applied (lbs P\textsubscript{2}O\textsubscript{5} / year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manure As- Excreted</td>
<td>469.9</td>
<td>129,556</td>
<td>26,996</td>
</tr>
<tr>
<td>Liquid Effluent</td>
<td>285.1</td>
<td>11,980.8</td>
<td>2,586.7</td>
</tr>
<tr>
<td>Slurry Application</td>
<td>42.0</td>
<td>7,987.2</td>
<td>1,724.4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>149,524</td>
<td>31,277</td>
</tr>
<tr>
<td>Plant Nutrient Demand</td>
<td></td>
<td>490,200</td>
<td>87,317</td>
</tr>
<tr>
<td>Percentage from Animals</td>
<td></td>
<td>30.5%</td>
<td>35.8%</td>
</tr>
<tr>
<td>Required Chemical Fertilizer</td>
<td></td>
<td>340,676</td>
<td>56,040</td>
</tr>
<tr>
<td>Percentage Demand from Fertilizer</td>
<td></td>
<td>69.5%</td>
<td>64.2%</td>
</tr>
</tbody>
</table>

The nutrient mass balance approach for HDF assumes that 100 percent of the manure nutrients are 100 percent available at the time of application. This is a very conservative way of calculating nutrients that are available for crop uptake, and ultimately the stocking density and number of animals that can be supported on the pasture. Because of nitrogen dynamics, most nutrient management plans only account for 50 percent of the nitrogen to be plant available while the other 50 percent is lost to the environment through volatilization. This nutrient balance analysis does not take any volatilization into account.
Plant nutrient uptake is also inefficient with respect to phosphorous because of the extensive sorption and binding reactions of phosphorous with the soils at the HDF site, sharply reducing the amount that is plant available. This mass balance uses the full amount of manure nutrients applied to the fields, whether it is irrigated, applied as slurry, or is excreted by the cow directly onto the pasture, as available to the crop, in the management of the farm's nutrient cycle and to determine the overall stocking density. If volatilization or soil sorption were taken into account, more manure nutrients (and more cows up to 2,000) could be used to maintain a healthy pasture and soil/crop nutrient balance.

While the nutrient deficits shown in Table 3.5-1 represent the supplemental fertilizer required for the Kikuyu crop, they are not an exact accounting of the total amount of commercial nutrients that must be applied to maintain high forage productivity and soil health. Rather, these values only represent the net amount of nutrients that need to be provided to and utilized by the crop through commercial fertilization, beyond the nutrient that is available to the crop from manure sources. Fertilization, especially the application of commercial nitrogen, can be inefficient with actual requirements with respect to forage production, and fertilization needs can be as much as 25 to 50 percent greater than the arithmetical difference resulting from a mass balance calculation - due to volatilization or soil sorption (Yost & Krueger, 2016). It should be noted and planned that the commercial fertilization requirements to maintain high forage productivity and soil health can exceed the simple arithmetic difference between the nutrients applied by manure and the forage uptake.

While these two factors in nutrient availability may seem contrary to each other in nutrient management analyses, where it would appear that manure nutrients are 100 percent available to the crop but more commercial nutrients would be needed due to inefficiencies in fertilization, the manure nutrient application and availability are first and foremost, the primary factors in measuring the stocking density of the farm, as the manure is the primary source of nutrients for the kikuyu crop. The commercial nutrient application is only meant to provide the needed deficit of nutrients to the crop, beyond what is provided by the manure, to maintain high forage productivity and soil health. The inefficiencies of nutrient application from a mass balance perspective and from a commercial fertilization perspective do not have the same impacts on the pasture-based rotation grazing dairy system. By assuming 100 percent of manure nutrients are available to the crop (though it is anticipated that nutrients are lost to volatilization of nitrogen and soil sorption of phosphorous), HDF is proposing a very conservative mass balance approach that reduces the stocking density of the farm. By understanding that commercial fertilizers are inefficient due to these same dynamics, HDF is realistic in its commercial fertilizer expectations and what is needed to provide the remaining nutrients to the crop that it does not get from manure sources.

3.5.4.3 Contingency Scenario

The ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows and more than 85 days of storage for 699 mature dairy cows. The ponds will also provide storage for normal precipitation over 30 days and rainfall from the 25-year/24-hour event. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000 cow dairy and nearly impossible for the committed 699 cow dairy. For the pond to become full would require a number of extremely low probability events occurring at the same time (large storm events in tandem, extended heavy rain periods, no irrigation days, and no application of the settling pond slurry). Throughout the 30-day storage period, effluent is planned for application every 4 days and the slurry application is expected at least once every 45 days, ensuring that the pond levels are kept at manageable levels.
Nonetheless, if the storage pond were full, the time to completely empty the pond is around 100 hours, if a cataclysmic storm was forecast. If warranted due to potential impact from the approaching storm event, the settling pond could also be pumped empty within an additional 36 hours. If the forecasted storm is forecast six days prior, then virtually no effluent would remain in the ponds when the storm arrives.

3.6 OFFSITE MILK PROCESSING

Under the proposed action, HDF will sell raw milk wholesale to a processor/packager. Milk processing includes pasteurization, bottling and packaging of milk. A processing facility would need refrigeration units, bulk product storage, bulk product transfers to containers, finished product packaging, and trans-shipment staging and loading.

Milk was processed by Meadow Gold at a facility in Puhi until the closure of Kaua‘i’s last dairy at Moloa‘a (Meadow Gold) in the year 2000. The Puhi, Kaua‘i facility could be retrofitted with cooperation from Meadow Gold, the state’s only current milk processor and bottler with operational facilities on O‘ahu and Hawai‘i Island. One option for retrofitting the existing facility could be to pasteurize milk on Kaua‘i, then ship the pasteurized milk to another island for processing and packaging. Another option could be to retrofit the existing facility to bring the milk to market by pasteurizing, bottling and packaging on Kaua‘i. This would be similar to the production of milk from the two existing dairies on the Big Island, where the majority of milk produced and processed is also on the Big Island. In addition to fluid milk, other milk products such as soft cheeses and yogurt could be produced as added-value products. Determination as to the best option for pasteurization and processing would be made by the processor/packager prior to the start of Hawai‘i Dairy Farms operations.

It is anticipated that agreements will be established for milk processing at the existing Meadow Gold Dairies Hawai‘i facility on O‘ahu. Under this scenario, Meadow Gold will take possession of the raw milk on Kaua‘i for shipment. Milk will be trucked in chilled containers from Kaua‘i to the interisland barge dock at Nawiliwili Harbor. Containers will be loaded aboard regularly scheduled interisland barge service, which can carry a variety of cargo including containers and vehicles. Once the barge arrives at its terminal on O‘ahu, containers will be trucked to the existing Meadow Gold processing facility in Honolulu.

Milk processing will be undertaken by the purchaser of raw milk and utilize existing process facilities, equipment, refrigeration units, bulk product storage, finished product packaging, and distribution. Milk and milk products would ultimately be sold to supermarkets and retail stores on O‘ahu, and possibly distributed to customers throughout the State.

3.7 OFFSITE HERD MANAGEMENT BY KAUA‘I RANCHERS

The milk production cycle of a cow begins after birth of a calf, when lactation begins. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised offsite. The permitted herd size of 699 mature dairy cows at the Māhā‘ulepū site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other ranches as needed for animal health and dairy productivity. This will both benefit the dairy, and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (female calves that haven’t given birth) will be raised until returned to the HDF herd as a birthing/milking cow.
Two ranches on Kaua‘i have initially expressed an interest in taking HDF calves and cows. Makoa Ranch near Kapa’a is an active cattle ranch run by the Farias family. The ranch will care for dry cows during an annual resting period, and raise calves until ready for return to HDF pasture. Calves suitable as beef cattle will be incorporated into the Makoa Ranch herd or sold to other ranching operations. “Close-up cows”, or those cows returning to milk production at HDF will initially be transferred to ʻOmaʻo Ranch for transition.

Annually, dairy cows are rested or “dried” for 60 days before returning to milk production. The existing ranch operations are established and require no additional facilities, permits, or improvements to have fluctuation in herd numbers, which is typical of cattle operations.

For the initial two years of operation with the committed herd size, approximately 600 cows and calves will be managed offsite. When the herd has matured, the number of animals to be managed offsite will be approximately 1,100. Section 3.8.4 shows the number of offsite animals under the contemplated herd size.

### 3.8 CONTEMPLATED HERD SIZE

#### 3.8.1 BUILDINGS AND AGRICULTURAL INFRASTRUCTURE

The building design and agricultural infrastructure is capable of accommodating both the committed Proposed Action herd size of up to 699 mature dairy cows, as well as the contemplated Proposed Action of a possible expanded herd up to 2,000 mature dairy cows. The number of animals moving through the dairy facilities would increase under the contemplated herd size. Specific differences between the committed and contemplated herd size are discussed in the following.

Potable water demand will increase with additional cows under the contemplated potential future herd size. Another 25 gpd per animal for drinking water is required, increasing the livestock water demand by approximately 12,500 gallons daily to a total of 50,000 gpd. Additional wash water of 17.4 gpd per animal would be required; this would increase demand by 22,640 gpd. The total potable water demand for up to 2,000 mature dairy cows would be 84,800 gpd, an increase of 54,800 gpd over the committed herd size.

<table>
<thead>
<tr>
<th>Design Criteria/Assumption</th>
<th>2,000 Mature Dairy Cows</th>
<th>Pond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Wastewater Generation</td>
<td>37,895.0 gpd</td>
<td></td>
</tr>
<tr>
<td>Percentage of Solids</td>
<td>1%</td>
<td>Settling</td>
</tr>
<tr>
<td>Volume of Accumulated Solids for 45-day Period Between Application</td>
<td>17,052.6 gal</td>
<td>Settling</td>
</tr>
<tr>
<td>Daily Effluent Flow to Storage Pond</td>
<td>37,895.0 gpd</td>
<td></td>
</tr>
<tr>
<td>Minimum Volume of Effluent Storage for 30-day Design Volume Period</td>
<td>1,136,841 gal</td>
<td>Storage</td>
</tr>
<tr>
<td>Depth of 25-Year, 24 Hour Storm</td>
<td>10.4 inches</td>
<td>Storage</td>
</tr>
<tr>
<td>Depth of 30-day Design Volume for Normal Precipitation</td>
<td>6 inches</td>
<td>Storage</td>
</tr>
</tbody>
</table>
As described in Section 3.3.2, the effluent ponds have been designed in accordance with NRCS and University of Hawai‘i guidance, and were reviewed by the Department of Health in the 2014 HDF Waste Management Plan. The pond design is the same for the committed and contemplated herd sizes. The regulatory design requirement is containment for 30 days of effluent storage for the herd size, plus precipitation and run-off from the 1.75-acre, uncovered portion of the facility that will receive manure and wash water, and precipitation from the 25-year, 24 hour storm event. The HDF pond design includes excess volume equivalent to 30-days of normal precipitation to the surfaces surrounding the pond and provides an additional buffer of 12 percent for spare volume for the 2,000-cow scenario.
3.8.2 **HERD MANAGEMENT**

Under the contemplated Proposed Action of an expanded herd, cows will be managed in larger groups (300-330 cows per mob). It takes more time to milk the entire mob, corresponding to an increase in animal numbers. However, the individual milking time for each cow remains 8- to 10-minutes per cow. The number of paddocks and the acreage remains the same.

With the contemplated herd of up to 2,000 mature dairy cows, there will be approximately 500 calves at any one time, 167 of which will be housed within the calf sheds. This is an increase of 350 calves over the committed herd size model.

3.8.3 **PASTURE MANAGEMENT**

Pasture management for the contemplated herd size of up to 2,000 mature dairy cows is similar to the committed herd size. The 469.9 acres of pasture will be divided into paddocks ranging from 3 to 5 acres in size. Mobs of 300 – 330 cows will graze adjacent paddocks, and move to the milking parlor one mob at a time twice each day.

It is expected that grass yields will improve by several tons per acre with establishment of the committed herd size of 699 mature dairy cows having provided organic nutrients from manure. As explained in Section 3.5.2, the organic matter will result in improved soils and more efficient nutrient uptake by plants. Yields achieved during trials at the HDF site have averaged 16.3 Tons of Dry Matter (DM) / acre / year. With manure and cows on site, yields are anticipated to rise, and HDF anticipates a future yield of 20 tons (U.S.) of Kikuyu dry matter production per acre per year.

The contemplated herd size would produce additional manure both within paddocks and in the milking parlor, providing additional organic nutrients and reducing the requirement of supplemental commercial fertilizer. As a conservative estimate, the nutrient mass balance for the contemplated herd size assumes the grass yields do not increase. As shown in Table 3.8-2, the percentage of nitrogen provided by animals is 88.3 percent, an increase of 57.8 percent over the amount provided by the committed herd size (shown in Table 3.5-1). The percentage of phosphorus increases by 68.4 percent from the amount provided by the committed herd size.

**Table 3.8-2  Nutrient Mass Balance for Contemplated Herd Size up to 2,000 Mature Dairy Cows**

<table>
<thead>
<tr>
<th>Nutrient Application</th>
<th>Area (acre)</th>
<th>Nitrogen Applied (lbs N/ year)</th>
<th>Phosphorus Applied (lbs P\textsubscript{2}O\textsubscript{5} / year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manure As- Excreted</td>
<td>478.5</td>
<td>374,308</td>
<td>78,293</td>
</tr>
<tr>
<td>Liquid Effluent</td>
<td>285.1</td>
<td>35,013.7</td>
<td>7,631.7</td>
</tr>
<tr>
<td>Slurry Application</td>
<td>171.0</td>
<td>23,342.5</td>
<td>5,087.8</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>432,664</td>
<td>91,012</td>
</tr>
<tr>
<td>Plant Nutrient Demand</td>
<td>490,200</td>
<td></td>
<td>87,317</td>
</tr>
<tr>
<td>Percentage from Animals</td>
<td></td>
<td>88.3%</td>
<td>104.2%</td>
</tr>
<tr>
<td>Required Chemical Fertilizer</td>
<td>57,536</td>
<td></td>
<td>(3,695)</td>
</tr>
<tr>
<td>Percentage Demand from Fertilizer</td>
<td>11.7%</td>
<td></td>
<td>(4.2)%</td>
</tr>
</tbody>
</table>
Total calculation for phosphorus provided by animals exceeds the plant demand at the dry matter yield of 16.3 Tons of DM/acre/year. With a one-ton increase, to 17.3 Tons of DM/acre/year, phosphorus will return to a deficit and require supplemental commercial fertilizer.

Nutrient management and mass balance analyses are dynamic and are influenced by the many different environmental variables that enter into nutrient cycle planning. Variables include grass yields, stocking density, manure nutrient content, soil nutrient content, and crop nutrient content. Several management options exist to keep phosphorus and other nutrients in balance, which may include and are not limited to: improved soil health from initial additions of phosphorus, reduction in contemplated herd size to approximately 1,875 mature dairy cows, or the expected increase in the grass yields from 16.3 tons of DM per acre per year to 20 tons of DM per acre per year (though an increase to 17.3 tons of DM per acre per year would be sufficient to bring phosphorus applications back into balance with crop demand and eliminate any phosphorus overage). Higher grass yields would demand additional phosphorus. Nitrogen from commercial fertilizer would be required at both 1,875 and 2,000 mature dairy cows.

3.8.4 OFFSITE HERD MANAGEMENT

As shown in Section 3.4, the cows managed offsite include cows returning to productivity at HDF, cows in rest, heifers raised until becoming productive dairy cows at HDF, and baby steers available for beef operations. Initially, the contemplated herd size of up to 2,000 mature dairy cows at HDF will provide an additional 900 cows for other ranches to manage. With the contemplated herd fully operational, approximately 2,000 cows will be managed by other ranches.

3.9 PROJECTED COSTS

Total project development costs are estimated to be between $9.5 and $11.5 million. These costs included projected construction needs as well as related equipment expenses to fully develop the project.

3.10 IMPLEMENTATION AND PERMIT SCHEDULE

The timing for implementation of the dairy development is tied to the completion of plan reviews, document reviews, permits and approvals. Table 3.10-1 provides a summary of permits required and status, and an implementation timetable.
### Table 3.10-1  Permit Listing and Implementation Timetable

<table>
<thead>
<tr>
<th>Permit / Milestone</th>
<th>Agency</th>
<th>Status</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Committed Herd Size (699 Mature Dairy Cows)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conservation Plan</td>
<td>NRCS / WKSCD</td>
<td>Approved</td>
<td>12/2013</td>
</tr>
<tr>
<td>Grading Permit Agriculture Exemption</td>
<td>COK</td>
<td>Approved</td>
<td>03/2014</td>
</tr>
<tr>
<td>Individual Wastewater System (IWS)</td>
<td>HDOH</td>
<td>Approved</td>
<td>04/2014</td>
</tr>
<tr>
<td>Waste Management Plan, Phase 1 (699 Cows)</td>
<td>HDOH</td>
<td>Reviewed</td>
<td>10/2014</td>
</tr>
<tr>
<td>Section 404 Permit Exemption</td>
<td>USACE</td>
<td>Approved</td>
<td>10/2014</td>
</tr>
<tr>
<td>Building Permit</td>
<td>COK</td>
<td>Approved</td>
<td>11/2014</td>
</tr>
<tr>
<td>Monitoring Well Construction Permits</td>
<td>DLNR CWRM</td>
<td>Approved</td>
<td>07/2015</td>
</tr>
<tr>
<td>NPDES – General Permit for Construction Activities</td>
<td>HDOH</td>
<td>In progress</td>
<td>12/2016</td>
</tr>
<tr>
<td>Conservation Plan Update</td>
<td>NRCS / WKSCD</td>
<td>In progress</td>
<td>2016</td>
</tr>
<tr>
<td>HRS Chapter 6E – Historic Preservation Review</td>
<td>DLNR/SHPD</td>
<td>In progress</td>
<td>2016</td>
</tr>
<tr>
<td>Anticipated EIS Acceptance</td>
<td>HDOH</td>
<td>In Progress</td>
<td>2016</td>
</tr>
<tr>
<td>Construction Mobilization</td>
<td>HDF</td>
<td></td>
<td>2017</td>
</tr>
<tr>
<td>Facility Construction (Milking Parlor, Sheds, Holding Yard, Ponds)</td>
<td>HDF</td>
<td></td>
<td>2017 - 2018</td>
</tr>
<tr>
<td>Farm Infrastructure (Roads, Wells &amp; Pumps, Piping, Power, Fencing, Crossings)</td>
<td>HDF</td>
<td></td>
<td>2017 - 2018</td>
</tr>
<tr>
<td>Paddocks and Pasture (Grass Establishment)</td>
<td>HDF</td>
<td></td>
<td>2017 - 2018</td>
</tr>
<tr>
<td>Milk Producer Permit / Operational Permits</td>
<td>HDOH / USDA</td>
<td></td>
<td>2017</td>
</tr>
<tr>
<td>Permit Closeout / Certificate of Occupancy</td>
<td>HDF</td>
<td></td>
<td>2017</td>
</tr>
<tr>
<td>Start of Operations (699 Mature Dairy Cows)</td>
<td>HDF</td>
<td></td>
<td>2018</td>
</tr>
<tr>
<td><strong>Contemplated Herd Size (2,000 Mature Dairy Cows)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste Management Plan (2,000 Cows)</td>
<td>HDOH</td>
<td></td>
<td>To be determined</td>
</tr>
<tr>
<td>NPDES – CAFO Permit (2,000 Cows)</td>
<td>HDOH</td>
<td></td>
<td>To be determined</td>
</tr>
</tbody>
</table>
4.0

**ENVIRONMENTAL SETTING, POTENTIAL IMPACTS, AND MITIGATION MEASURES**
4.0 THE ENVIRONMENTAL SETTING, POTENTIAL IMPACTS, AND MITIGATION MEASURES

4.1 Climate................................................................................................................................................................ .... 4-3
4.2 Topography ........................................................................................................................................................... 4-6
4.3 Soils................................................................................................................................................................ .......... 4-7
4.4 Land Use and Agricultural Setting.............................................................................................................4-14
4.5 Visual and Aesthetic Resources..................................................................................................................4-18
4.6 Natural Hazards ................................................................................................................................................4-22
4.7 Archaeological and Historic Resources ...................................................................................................4-25
4.8 Cultural Practices and Resources ..............................................................................................................4-31
4.9 Flora.......................................................................................................................................................................4-33
4.10 Fauna.....................................................................................................................................................................4-35
4.11 Invertebrate Species And Pest Insects .....................................................................................................4-39
4.12 Noise......................................................................................................................................................................4-43
4.13 Hazardous Substances...................................................................................................................................4-44
4.14 Public Services...................................................................................................................................................4-46
4.15 Demographic and Economic Conditions .................................................................................................4-47
4.16 Groundwater Resources................................................................................................................................4-51
4.17 Surface Water Resources & Nearshore Marine Environment ..................................................................4-60
4.18 Roadways and Traffic......................................................................................................................................4-68
4.19 Air Quality, Odor, and Greenhouse Gas....................................................................................................4-71
4.20 Summary of Probable Impacts and Contextual Issues .............................................................................4-78
4.21 Demographic and Economic Conditions (Contemplated Herd Size) ..........................................................4-88
4.22 Groundwater Resources (Contemplated Herd Size) ....................................................................................4-88
4.23 Surface Water Resources (Contemplated Herd Size) ..................................................................................4-89
4.24 Roadways and Traffic (Contemplated Herd Size) .......................................................................................4-91
4.25 Air Quality, Odor, and Greenhouse Gases (Contemplated Herd Size) ..........................................................4-92
4.26 Summary of Probable Impacts and Contextual Issues (Contemplated Herd Size).................................4-96
4.27 Unresolved Issues ......................................................................................................................................... 4-102
This chapter describes the existing environmental conditions and identifies probable impacts of the proposed project. “Environmental conditions” include human and economic conditions as well as natural resources. Strategies to mitigate significant impacts are identified.

As described in Section 2.4, Hawai’i Dairy Farms (HDF) is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture based, rotational-grazing system is an economically and environmentally sustainable model for Hawai’i. With proven success at a herd size of 699, HDF may contemplate possible expansion of the herd in the future. A possible expansion of the herd would require additional permits that would be sought at such time as HDF may decide to pursue an expanded operation. However, to fully disclose potential impacts of both the committed herd size and the contemplated, possible expansion up to a 2,000-milking cow herd, this chapter presents possible impacts of both herd sizes where applicable.

Sections 4.1 – 4.14 present resource conditions and probable impacts that will not differ between the herd size. Impacts that may change with dairy operations at different herd sizes begin with Section 4.15, Demographic and Economic Conditions. Probable impacts and mitigation from the committed herd size of up to 699 milking cows are presented in Sections 4.15 through 4.20. Probable impacts and mitigation for the contemplated expansion of the herd potentially up to 2,000 milking cows are presented in Sections 4.21 through 4.26.
4.1 CLIMATE

Climatic conditions affect the growth of forage and the health of dairy cows. Heat stress can reduce the productivity of dairy cows, and suitable climatic conditions were an important consideration in siting the dairy. Cows in the pasture-based system are on pasture 22 hours of each day and therefore exposed to natural airflow with ample space between animals for cooling. Selecting an appropriate breed of cow for Hawai‘i’s climate was another important consideration for HDF.

4.1.1 Existing Conditions - Climate

The Po‘ipū area is generally known for its mild conditions. Temperatures range from 72 to 86°F in the summer months, and 64 to 80°F in the winter. The area’s climate is greatly influenced by its inland location and valley topography. Winds in the Po‘ipū area are generally from the east-northeast direction (tradewinds) ranging from 5 to 15 miles per hour. Wind conditions vary depending on season and weather conditions, as occasional storms can generate strong Kona winds from the south, and land breeze circulations can develop during times of weak tradewind conditions.

Meteorological data for 2014 was obtained for the project site. Depicted on a windrose, the data shows predominant winds from the northeast. The strongest winds come periodically from the southwest. Calm conditions occur just 1 percent of the time (Figure 4.1-1).

![Wind Direction and Wind Speed](image-url)
Average rainfall in Māhā'ulepū is just under 50 inches annually.

Table 4.1-1  Average Monthly Rainfall Data

<table>
<thead>
<tr>
<th>Month</th>
<th>Mean Monthly Rainfall (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>4.88</td>
</tr>
<tr>
<td>February</td>
<td>4.20</td>
</tr>
<tr>
<td>March</td>
<td>5.04</td>
</tr>
<tr>
<td>April</td>
<td>3.66</td>
</tr>
<tr>
<td>May</td>
<td>3.05</td>
</tr>
<tr>
<td>June</td>
<td>2.86</td>
</tr>
<tr>
<td>July</td>
<td>3.13</td>
</tr>
<tr>
<td>August</td>
<td>3.20</td>
</tr>
<tr>
<td>September</td>
<td>3.25</td>
</tr>
<tr>
<td>October</td>
<td>4.96</td>
</tr>
<tr>
<td>November</td>
<td>6.01</td>
</tr>
<tr>
<td>December</td>
<td>5.71</td>
</tr>
<tr>
<td><strong>Annual</strong></td>
<td><strong>49.95</strong></td>
</tr>
</tbody>
</table>

*Source: Giambelluca et al. 2013*

Rain gauge data for a rain gauge located near the site off Māhā'ulepū Road (“Māhā'ulepū 941.1”) was obtained from National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center. The data reveal that more than a week of consecutive rain is very unusual for Māhā'ulepū Valley. The rainfall events for 30 years were recorded (a total of 10,957 days from 1/1/1984 to 12/31/2013) and ranked based on days of consecutive rainfall (DAPR) and the corresponding multiday precipitation total (MDPR). Table 4.1-2 shows only 5 occurrences in the last 30 years with more than a week of consecutive rain. And rainfall exceeded 2 or more inches of rain during only 4 of those occurrences, with 2.6 and 3.7 inches recorded (highlighted in following table).

Table 4.1-2  NOAA Rain Gauge Data

<table>
<thead>
<tr>
<th>DATE</th>
<th>MDPR (inches)</th>
<th>DAPR</th>
<th>Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>19960108</td>
<td>1.90</td>
<td>17</td>
<td>1</td>
</tr>
<tr>
<td>19920922</td>
<td>2.60</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>19930104</td>
<td>3.70</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>19960930</td>
<td>0.20</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>19980105</td>
<td>1.48</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>19920928</td>
<td>0.02</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>19940105</td>
<td>0.03</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>19960923</td>
<td>0.03</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>19970106</td>
<td>0.05</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>20031229</td>
<td>0.20</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>19861229</td>
<td>0.04</td>
<td>5</td>
<td>21</td>
</tr>
</tbody>
</table>
Solar radiation in the project area is estimated to range from a low of 155.2 watts/square meter in January to a high of 234.5 watts/square meter in June, with an annual average of 196.6 watts/square meter (Giambelluca et al., 2014). This is in comparison to the highest solar intensity for Kaua‘i in the south Po‘ipū area, estimated to range from a low of 164 watts/square meter in December to a high of 296.6 watts/square meter in June, with an annual average of 238.5 watts/square meter. The solar radiation values are estimates, as routine monitoring of solar radiation occurs at relatively few locations in Hawai‘i. University of Hawai‘i researchers have estimated values across the State by combining modeling with observations from ground stations and satellites. The effects of clouds and shading on terrain are incorporated. Information on solar radiation informs evapotranspiration which, in turn, informs understanding of the hydrologic cycle (Giambelluca et al., 2014).

Evapotranspiration is variable and influenced by climate factors, soils properties, and types of vegetation. As evapotranspiration rates are difficult to measure directly, the rates for Hawai‘i have been modeled and mapped across the state. The modeling was conducted to inform management of water resources and to plan conservation activities under agreement between the State of Hawai‘i Commission on Water Resource Management and the U.S. Army Corps of Engineers. Additional information can be found at: http://evapotranspiration.geography.hawaii.edu.

**4.1.2 Probable Impacts and Mitigation Measures - Climate**

Impacts that would be considered significant related to climate could include:

- Increase in solar radiation; and
- Changes to the evapotranspiration cycle from dairy operations.

Greenhouse gas emissions are discussed in Section 4.19.3, Greenhouse Gases.

**Short-term Impacts and Mitigation - Climate**

Changes to solar radiation and the evapotranspiration cycle large enough to affect climate would be large-scale and long-term. The scale of HDF is not large enough to influence these global cycles. Neither the committed Proposed Action (699 milking cows) nor the contemplated Proposed Action (expanded herd) will impact climate conditions in the short-term. No significant impacts are anticipated, and no mitigation would be required.

**Long-term Impacts and Mitigation - Climate**

The scale of HDF is not large enough to influence global cycles of solar radiation and the hydrologic cycle. Minimal construction and an increase in ground cover density will not affect climate processes. The Proposed Action will increase vegetative density across the pasture areas, which will hold more moisture than the current intermittent coverage of vegetation across the site. The 557-acre site is not large enough to have a regional influence on climate.

Neither the committed herd size nor the contemplated herd size will impact climate conditions in the long-term. No significant impacts are anticipated, and no mitigation would be required.
4.2 TOPOGRAPHY

4.2.1 Existing Conditions - Topography

The project site is situated in the valley of Māhā'ulepū ahupua'a on the island of Kaua'i. Māhā'ulepū Valley is located on the leeward side of the Ha'upu mountain ridge, which runs in the east-west direction. The valley is flanked by low ridges. From Mount Ha'upu at 2,297 feet above mean sea level (AMSL), the highest point along the ridge forming the back of the valley, the ground drops steeply down to the valley bottom at an elevation of about 150 feet AMSL.

The upper reach of the dairy farm property begins at the 150 feet AMSL elevation, gradually sloping to an elevation of 60 feet AMSL along Māhā'ulepū Road on the makai side of the project site. Terrain within the dairy typically slopes from 2 to 15 percent, which is the gentle slope required for the comfort of dairy cows when grazing and navigating between paddocks and the milking parlor. Isolated areas of steeper slopes associated with drainages installed by plantation era agricultural operations cross the areas proposed for pasture.

4.2.2 Probable Impacts and Mitigation Measures - Topography

Impacts that would be considered significant related to topography could include:
- Changes to drainage patterns from large-scale excavation, filling, or leveling; and
- Potential for loss of stability.

Facility design utilizes guidance from the Natural Resources Conservation Service (NRCS), National Engineering Handbook (NEH) and from the American Society of Agricultural and Biological Engineers. Conservation practices established in NRCS technical guidance are incorporated both into the design and construction, including the animal walkways (Pacific Islands Area - PI - Code 575), the access road and waterway crossing (Codes 560 and 578), and heavy use area protection (PI Code 561).

The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site: the milking parlor, calving sheds, implement shed; supporting agricultural infrastructure such as silos and stormwater controls; and the section of paved road with truck turn-around. Areas surrounding the built facilities will be graded to create drainage swales and berms, to install underground pipelines, and to modify existing farm roads and establish cow walkways.

Existing drainage ways will be protected from impacts of cows through fencing, to be installed 35-feet from the top of each bank. Within the pasture area, low lying areas, berms, and other features previously installed by former agricultural operations may be smoothed as needed to minimize hazards to cows.

Best management practices to avoid, control and capture soil erosion from grading and ground disturbance are discussed in Section 4.17, Surface Water Resources. Foundation areas for buildings will utilize cut and fill within the site to minimize disturbances to topography.
Short-term Impacts and Mitigation – Topography

Structural and management controls to limit and route drainage within the construction area are explained in Section 4.17 Surface Water Resource Impacts.

Changes to drainage on the project site in the short-term are not anticipated to be significant as a result of dairy construction. No mitigation is required.

Long-term Impacts and Mitigation - Topography

The existing major drainage ditches on the site will be maintained. Within the 10-acre dairy facility area, swales will be installed as part of the drainage design to route stormwater run-off according to best management practices for livestock operations. In the pasture area, previously installed swales for agriculture and low-lying areas may be smoothed or filled in accordance with NRCS Practice Code for Land Smoothing, to improve surface drainage and uniformity for grazing.

Existing farm roads and cow raceways will be elevated above the pasture grade. Surfaces will be slightly crowned to ensure drainage to either side of the road or raceway and swales roughly 12-inches in depth will be created parallel to each road or raceway. Design and installation of roads, raceways and swales will be in compliance with the HDF Conservation Plan and utilize standards from applicable NRCS Practice Codes.

Changes to topography, including improved drainage, are not anticipated to be significant over the long-term. No mitigation is required.

4.3 SOILS

Soil health, also referred to as soil quality, is defined as the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans. Soil contains living organisms that perform functions required to grow food and fiber. Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during dryer periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem running smoothly (NRCS, 2015).

Comments received during the initial scoping for this Environmental Impact Statement (EIS) included a “Custom Soils Resource Report for Island of Kaua’i, Hawai’i.” The report was generated from the United States Department of Agriculture (USDA) NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

4.3.1 Existing Conditions - Soils

The types of soils in Māhā’ulepū Valley and soil properties are both relevant to this EIS. The information presented is based on NRCS soils maps, supplemented with two rounds of independent soil sampling to characterize available soil nutrients and conditions. Baseline conditions and implications for long-term soil health and productivity are summarized in the following section, and recommendations for nutrient management are included in the report attached as Appendix C, Hawai‘i Dairy Farms Soils Baseline Nutrient Status.
Soil Types

NRCS has mapped and classified soils for more than 95 percent of the United States. Table 4.3-1 summarizes the soil types for the project area. The most abundant soil types occurring throughout the HDF site are Kalihi Clay and Kaʻena Clay Brown Variant. These soils underlay 32 percent and 29 percent of the dairy project area, respectively (Figure 4.3-1). The Kalihi series is described as “poorly drained” soils that developed in alluvium derived from basic igneous rock. Average annual soil temperature is 74°F. The Kaʻena series is described as a very deep soil, also as poorly drained, and is primarily located on alluvial fans and talus slopes on both Oʻahu and Kauaʻi. Elevations of this soil series vary anywhere from 50 to 150 feet.

The classification of soils as poorly drained indicates the relatively slow rate water movement within soil and to surrounding areas. Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas “drainage” refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity (Yost, 2016). Hydraulic conductivity is further discussed in the following section, Soil Properties.

Soils classified as poorly drained often exhibit anaerobic conditions. Anaerobic conditions typically result in higher rates of denitrification, which is the conversion of nitrate and nitrite to gaseous forms. This essentially reduces the potential for nitrate impacts on waterbodies. With reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. In this way, “poorly drained” soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than “well drained” soils (Yost, 2016).

<table>
<thead>
<tr>
<th>Soil Classification Map Unit Abbreviation</th>
<th>Slope Range (%)</th>
<th>Area within HDF (% of total)</th>
<th>Area within HDF (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hanamau lu Silty Clay HsD</td>
<td>15 to 20%</td>
<td>2.55%</td>
<td>14.2</td>
</tr>
<tr>
<td>Hanamau lu Stony Silty Clay HtE</td>
<td>10 to 35%</td>
<td>0.08%</td>
<td>.5</td>
</tr>
<tr>
<td>Kaʻena Clay, Brown Variant KavB</td>
<td>1 to 6%</td>
<td>28.66%</td>
<td>159.5</td>
</tr>
<tr>
<td>Kaʻena Clay, Brown Variant KavC</td>
<td>6 to 12%</td>
<td>4.09%</td>
<td>22.8</td>
</tr>
<tr>
<td>Kalapa Silty Clay KdF</td>
<td>40 to 70%</td>
<td>0.37%</td>
<td>2.1</td>
</tr>
<tr>
<td>Kalihi Clay Ke</td>
<td>n/a</td>
<td>31.68%</td>
<td>176.4</td>
</tr>
<tr>
<td>Kalapa Very Rocky Silty Clay (Very Rocky) KEHF</td>
<td>40 to 70%</td>
<td>.28%</td>
<td>1.6</td>
</tr>
<tr>
<td>Lualualei Clay LuB</td>
<td>2 to 6%</td>
<td>13.69%</td>
<td>76.2</td>
</tr>
<tr>
<td>Pakala Clay Loam PdA</td>
<td>0 to 2%</td>
<td>2.98%</td>
<td>16.6</td>
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<tr>
<td>Pakala Clay Loam PdC</td>
<td>2 to 10%</td>
<td>8.61%</td>
<td>47.9</td>
</tr>
<tr>
<td>Waikomo Stony Silty Clay Ws</td>
<td>n/a</td>
<td>7.0%</td>
<td>39.0</td>
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<tr>
<td><strong>Total Acreage</strong></td>
<td></td>
<td></td>
<td><strong>556.8</strong></td>
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Figure 4.3-1 Soils Characterization at HDF
Soil samples were taken throughout the site in April, 2014 and February, 2015. Laboratory analysis of 2014 soil samples identified pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

The second round of field sampling was conducted in 2015 by University of Hawai‘i researchers acting as technical consultants. This sampling focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen, phosphorus, calcium, magnesium, and potassium.

The NRCS Nutrient Management Standard provides a phosphorus leaching index for Hawai‘i soils. The leaching potential for each soil type at HDF is low, with an index value of 10 to 18 which is well below the upper index value of 30 still considered low. The moderate index ranges from 30 to 90, and the high index is for values above 90. Under the NRCS Nutrient Management Standard, on low risk soils, phosphorus can be applied at rates greater than crop requirements, not to exceed the nitrogen requirement for the succeeding crop, if manure or other organic materials are used to supply nutrients. Since the grass crop is not newly planted for each rotation and the growing season is constant and year-round, the phosphorus application is planned to be managed and adjusted to not exceed the crop requirement rate.

**Soil Properties**

Manure will add organic matter to the soil, which improves soil structure. Higher levels of humus and organic matter compounds can improve porosity of soils, which improves water-holding capacity, infiltration rate, and water-capture efficiency. With improved porosity, rainwater can more quickly penetrate the soil, resulting in less runoff and higher rates of water retention. Uptake of carbon dioxide from the atmosphere by plants is the process of photosynthesis. When cows eat plants, organic carbon is returned to the soils as manure. Forms of carbon that are difficult to break down become stabilized in the soil as humus, which provides stable organic material that maintains soil tilth and enhances the ability of soils to absorb water and nutrients (ATTRA, 2001).

Traditionally, soil has been the largest area of storage for carbon on earth. However, human disruption of the carbon cycle throughout periods of modern industrialization has released excess carbon into the atmosphere and into the oceans, resulting in a lack of stable carbon that was previously stored in soils. Photosynthesis is the greatest catalyst of transferring carbon from the air into soil. Once in soils, carbon feeds soil microbes that assist plants in acquiring nutrients and create stable forms of soil carbon (Center for Food Safety, 2015). Microbes such as mycorrhiza effectively transport a variety of needed nutrients effectively into plants, including nitrogen and phosphorus. High rates of synthetic fertilizers have interrupted the biological efficiency of nutrient uptake by plants; in a biologically active environment, ammonia is rapidly converted into an organic form of nitrogen that cannot be leached or volatilized (Jones, 2015).

In waste treatment, the primary functions of soil are to prevent migration of pathogens to surface water or groundwater, retard and reduce contaminants, and provide a barrier against direct human contact.
with effluent. A study prepared for the State of Hawai‘i Department of Health (DOH), Safe Drinking Water Branch identified groundwater zones most at risk from on-site disposal systems by evaluating – among other parameters - soil filtering capacity. Titled *Human Health and Environmental Risk Ranking of On-Site Sewage Disposal Systems for the Hawaiian Islands of Kauai, Molokai, Maui, and Hawaii* (Whittier and El-Kadi, 2014), the study mapped soil hydraulic conductivity state-wide. For adequate treatment to occur, the soil must be permeable enough to prevent saturated conditions, but also have a small enough pore throat diameter to filter pathogens from the effluent. Clay particles act as sorption sites for nitrate and other nutrients. Bacteria in soils can convert reactive nitrogen species into inert nitrogen gas (Whittier and El-Kadi, 2014).

Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. The hydraulic conductivity of permeable flank lavas in the Hawaiian Islands ranges from hundreds to thousands of feet per day, whereas estimates for less permeable dike-intruded lavas range from 1 to 500 feet per day (Hunt, 1996, in Whittier and El-Kadi, 2014). Figure 4.3-2 depicts the hydraulic conductivity for the south Kaua‘i area. Permeable lavas, represented by a high hydraulic conductivity, increase the distance groundwater can travel before pathogens die-off or contaminants can degrade to a point of being benign (Whittier and El-Kadi, 2014). The weathered alluvium of Māhā‘ulepū Valley shows a hydraulic conductivity on the order of 10.5 – 50 feet per day, whereas the adjacent soils of the Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area, allowing greater time for the remedial properties of soil and associated bacteria to denitrify nitrates and render potential contaminants inert.

Implications of soil hydraulic conductivity in the Kōloa-Po‘ipū and Māhā‘ulepū regions are discussed in Section 4.16.2, Potable Water.

### 4.3.2 Probable Impacts and Mitigation Measures - Soils

Impacts that would be considered significant related to soils could include:

- Increased potential for soil loss or erosion;
- Depletion or enhancement of soil nutrients and reduction or increase in organic matter; and
- Creating imbalance of soil nutrients and minerals through application of nutrients in manure and fertilizer.

Minimizing and controlling erosion from construction is discussed in Section 4.2, Topography, and Section 4.17, Surface Water Resources and Nearshore Marine Environment.
Figure 4.3-2 Soil Hydraulic Conductivity
Short-term Impacts and Mitigation - Soils

Short-term soil impacts during establishment of the dairy farm will include earthwork for the dairy facility, creating cow raceways, paving key road areas within the dairy facility, improvements to existing drainage systems, and installation of effluent storage ponds and utility infrastructure. The dairy project has been granted an exemption under Section 22.7.6 of the County Sediment and Erosion Control Ordinance by the County of Kaua’i Department of Public Works provided that conservation practices documented in the HDF Conservation Plan are employed.

Soil conservation is a core principal of the Conservation Plan. Applicable conservation practices are listed in Chapter 3, Section 3.2, Conservation Practices. NRCS practice codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. Work to date at HDF has followed the Conservation Plan, which was been approved by the West Kaua’i Soil and Water Conservation District in December 2013.

Best management practices are described in Section 4.17, Surface Water Resources and Nearshore Marine Environment. These practices will be documented in the Stormwater Pollution Protection Plan to be submitted as part of the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit.

Soil loss during construction will be minimized through the various best management practices and controls. Soil loss is expected to be within permitted thresholds. No significant impacts will result.

Long-term Impacts and Mitigation – Soils

The soil types in HDF are classified as poorly drained, depleted of nutrients. Step one to improve soils for sufficient crop growth is to restore nutrients. Nutrients beyond the crop demand will be taken up by the soils, and will begin to build to levels that will be reflected in improved tilth. The soils are suitable for nutrient application, initially a higher percentage of commercial fertilizers followed by increasing organic nutrients from manure as the herd matures. Estimates by the groundwater engineer are two percent of the nitrogen, and one percent of the phosphorus may pass through to shallow ground water and eventually discharge to the ocean (see Section 4.17, Surface Water Resources and Nearshore Marine Environment). The poorly permeable soils allow little movement of groundwater, which provides ample time for denitrification and for biological organisms in the soil to make nutrients available for plants.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide (Lal 2004, in Machmuller et al., 2015). The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons (Machmuller et al., 2015).

Long-term soil impacts are anticipated to result in improvements to the physical, chemical, and biological condition of the soil.
HAWAI‘I DAIRY FARMS
Draft Environmental Impact Statement

4.4 LAND USE AND AGRICULTURAL SETTING

4.4.1 Existing Conditions - Land Use and Agricultural Setting

The project area occupies agricultural land in Māhā‘ulepū Valley, an area that has a long history of agricultural use, as it was the first place in the island chain where sugarcane was commercially grown. The property is an Agricultural District per State Land Use District designations. The property also features land classified as Prime per the State Department of Agriculture's Agricultural Lands of Importance to the State of Hawai‘i (ALISH).

In 2005, the State established Important Agricultural Lands (IAL) by statute. The purpose of IAL lands is to conserve and protect agricultural lands, promote diversified agriculture, increase agricultural self-sufficiency and assure the availability of agriculturally suitable lands. The designation process determines that the land meets physical requirements including contiguous, functional land units large enough to allow flexibility in agricultural production near appropriate infrastructure and water, with high soil agricultural productivity ratings under the Land Study Bureau of University of Hawai‘i.

The State Land Use District Boundaries under the State of Hawai‘i Land Use Law classify the uses of lands within Hawai‘i to accommodate growth and development while still retaining the natural resources in the area. The dairy site is situated in the State designated Agricultural District and the County of Kaua‘i designated Agriculture District (Figure 4.4-1).

In 2011, in accordance with Hawai‘i Revised Statutes (HRS) 205-44 and -45 and Hawai‘i Administrative Rules (HAR) Chapter 15-15, Mahaulepu Farm LLC filed a petition with the State of Hawai‘i Land Use Commission (LUC) to designate 1,533 acres of agricultural lands in Māhā‘ulepū (including 557 acres that make up the Hawai‘i Dairy Farm project area) as Important Agricultural Lands (IAL) under the IAL provision of the Hawai‘i State Constitution (Article XI, Section 3). Figure 4.4-2 shows the IAL designation in the South Kaua‘i region. The IAL designation meets the objectives of HRS 205-42 by contributing to the maintenance of a strategic agricultural land resource base to support a diversity of agricultural activities and opportunities that expand agricultural income and job opportunities.

The designation process determined that the land meets a number of requirements established in HRS §205-45, including contiguous, functional land units large enough to allow flexibility in agricultural production near appropriate infrastructure and water, with 88.5 percent of the area featuring an overall soil agricultural productivity rating of “B” (with ‘A’ representing the class of highest productivity soils and “E” representing the lowest) per the Land Study Bureau of U.H.
The 2000 Kaua‘i General Plan recommended community involvement in planning for the future of Māhā‘ulepū to take into consideration various interests and factors to include: the long-term need to manage lands for preservation of significant natural and cultural features; the landowner’s desire to develop revenue-producing uses that are sensitive to the area’s unique qualities; the need to secure permanent public access to the shoreline; and the potential to create a coastal park (COK, 2000). Grove Farm Company, Inc., in response to a State resolution supporting future preservation of the Māhā‘ulepū ahupua‘a, testified for re-assertion of its rights to plan for its own lands and expressed concern that development of a park or public use of Māhā‘ulepū would support a takings action for government ownership. Grove Farm has continued to allow public access and use of Māhā‘ulepū lands at its expense.

**Neighboring Areas**

Properties immediately surrounding the HDF site are in agricultural use. The south shore of Kaua‘i is home to some of the most productive farm land in the state, attributed to consistent sunshine, ample fresh water, and a large amount of Class A and B soils. The large tracts of farmland with a regional water system such as that maintained by Mahaulepu Farm and Grove Farm, allow for stability in support of farm ventures while providing local residents with a reliable source of employment (HDOA, 2016).

Several single-family farm lot dwellings are located on agricultural lands approximately one mile west of the dairy site’s southwestern corner. The closest residential communities are Kōloa and Po‘ipū, approximately 2.3 miles and 2.5 miles away from the dairy facilities, respectively. Located to
the west and southwest of the dairy property, these communities have an estimated 3,704 housing units, an increase of roughly 3.1 percent since 2000. Approximately 36.8 percent of Kōloa-Po‘ipū housing units are vacant for seasonal, recreational, or occasional use, a higher proportion compared to 14.4 percent of units for Kaua‘i County as a whole (PEP, 2016).

The Po‘ipū Beach Resort area has been developed along the coastline over the past 30 years. During the 1970s and 1980s, agricultural lands in the Po‘ipū area were reclassified from State Agricultural District to Urban District, and rezoned by the County as Resort. Significant expansion along this coastline occurred from 1980 to present, with active development of hotels, timeshare condominiums, single-family resort residences, golf courses, and commercial development. This includes the Grand Hyatt Kaua‘i, Sheraton Kaua‘i Resort and Kōloa Landing.

The largest share of visitor units on Kaua‘i is located within the Po‘ipū/Kukui‘ula area. Of the 8,492 visitor units, 3,065 units were located in Po‘ipū/Kukui‘ula. This includes 1,124 hotel units, or 41.1 percent of the total number of hotel units on the island. Hotels in the area include the Grand Hyatt Kaua‘i Resort & Spa, Koa Kea Hotel & Resort, and the Sheraton Kaua‘i Resort. The Grand Hyatt Kaua‘i Resort & Spa, the closest hotel to the proposed Hawai‘i Dairy Farms, is located approximately 2.4 miles away from the dairy facilities and provides 602 visitor units (Figure 4.4-3).

### 4.4.2 Probable Impacts and Mitigation Measures - Land Use and Agricultural Setting

Impacts that would be considered significant related to Land Use could include:

- Non-compliance with State and County land use designations; and
- Request for change of State and County land use designations

**Short-term Impacts and Mitigation – Land Use and Agriculture**

The development of Hawai‘i Dairy Farms would be in full compliance with its agricultural State Land Use District designation, and embodies the IAL designation per the Hawai‘i State Constitution by using lands in the project area for their intended purpose of diversified agriculture and agricultural self-sufficiency.

No request for change of land use will be made and no short-term impacts are anticipated. No mitigation is needed.
**Figure 4.4-2 Important Agricultural Lands in Region**

Legend:
- **Project Boundary**
- **Important Agricultural Lands (IAL)**

4.5 VISUAL AND AESTHETIC RESOURCES

4.5.1 Existing Conditions - Visual and Aesthetic Resources

The Kōloa-Po‘ipū-Kalaheo Planning District Heritage Resources shown in the Kaua‘i 2000 General Plan depict important landforms with ecological, recreational, cultural, and scenic value. The County’s intent is to preserve these scenic resources and public views, ranging from parks, to highway corridors, mountains and elevated landforms, as well as shoreline views. According to the resources map, the majority of the project area is identified as Open Space, Parks, Agriculture, and Conservation. To the southwest, the Pu‘u Hunihuni crater is identified as an important landform, and Ala Kinoiki Road is identified as a scenic roadway corridor. To the north/northeast, the Ha‘upu Mountains that surround the project area are identified as an important landform (Figure 4.5-1).

Existing views of the dairy property and adjoining agricultural lands at Māhāʻulepū Valley are shown in Figure 4.5-2. The dairy site is not visible from public vantage points along County
roadways or areas along the coastline. Access into the valley is limited to minimize conflict with existing agricultural operations. HDF lands are accessible from Māhāʻulepū Road or other agricultural roads, which are secured by farm gates. The majority of the dairy area has gentle topography, with no evident physical features standing out within this broad agricultural valley. Intervening vegetation and topography generally screen public views of the valley lowlands. From distant vantage points, portions of the HDF pasture area may be visible.

The tallest structures of the Hawaiʻi Dairy Farms facilities would include the milking parlor and associated storage tanks, all of which will be roughly 33 feet in height. These items are in keeping with the agricultural character of the area, and are expected to have minimal to no impact on public views of the Puʻu Hunihuni crater, views from the Ala Kinoiki Road corridor, or the views of the Mount Haʻupu surrounding the project. Dairy farm structures will conform to County height limits for agricultural zoned land.

Figure 4.5-1 Hawaiʻi Dairy Farms Site in Māhāʻulepū Valley, Kauaʻi

4.5.2 Probable Impacts and Mitigation Measures - Visual and Aesthetic Resources

Impacts that would be considered significant related to visual resources could include:

- Changes or obstructions to views due to construction activities and/or equipment; and
- Potential impacts on visual resources by permanent dairy structures and facilities.

Short-term Impacts and Mitigation – Visual and Aesthetic Resources

Views during the farm development phase will show pasture establishment (grazing grass crop grow-out, pasture mowing, fence installation) and facility construction (buildings, erection of silos and tanks). Views of the dairy support facilities development will be very limited, occurring more than 1,000 feet from Māhāʻulepū Road and several miles away from public roads. Construction activity will be short-term, lasting approximately four to six months. There are no public scenic views or lookouts that will be affected by construction of the dairy.
Due to the limited public access to view locations along farm roads in Māhā’ulepū Valley, there will be little or no impact to public views of the dairy property during the development of the dairy pastures and support facilities.

Figure 4.5-2 Views of Māhā’ulepū Valley and the Dairy Property
(View Key Provided in Figure 4.5-3)
Figure 4.5-3 View Key Map
Long-term Impacts and Mitigation - Visual and Aesthetic Resources

The tallest structures of the Hawai‘i Dairy Farm facilities include the milking parlor and the associated storage tanks, which will be roughly 33 feet tall. These facilities will be noticeable from offsite locations with distant views of the pastures and dairy facilities location. The proposed facilities are in keeping with the agricultural character of the area, and are expected to have minimal impact to public views.

There are no public scenic views or lookouts that will be affected by dairy development or operations. There will be no adverse effect to public views of the Pu‘u Hunihuni crater, views from the Ala Kinoiki Road corridor, or impediment to views of the Mount Ha‘upu.

4.6 NATURAL HAZARDS

Natural hazards affecting Hawai‘i include flooding, tsunamis, earthquakes, and hurricanes. According to the 2002 USGS Atlas of Natural Hazards in the Hawaiian Coastal Zone, the Po‘ipū coast has an Overall Hazard Assessment that ranges between low (3) to moderate (5). Figure 4.6-1 depicts the hazard ratings for the various natural hazards that could affect the Po‘ipū coastal area.

4.6.1 Existing Conditions - Natural Hazards

Flooding

The Māhā‘ulepū area is located within Federal Emergency Management Agency (FEMA) Zone X, based on FEMA Flood Insurance Rate Map (FIRM), which includes areas outside the 0.2% annual chance floodplain (Figure 4.6-2).

With the discontinuation of sugarcane cultivation in 1996, culverts and ditches in the valley became impacted with sediments and vegetation. During periods of high rainfall, reduced capacity caused Waiopili Ditch to be overwhelmed and stormwater was reported flowing across Māhā‘ulepū Road. Since leasing the site, HDF has worked with the landowner, Mahaulepu Farm, to remove sediments and restore capacity to the ditches. Calculations of rainfall runoff show sufficient drainage capacity in the ditches when maintained with minimal sediment build-up.

Tsunami Inundation

The proposed location for HDF lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone (Figure 4.6-2). There is no threat of tsunami inundation at the project site.

Hurricanes

Historical hurricane paths over the central Pacific show a typical pattern passing to the south of the Hawaiian Islands, with a maximum hurricane occurrence during the late summer when the ocean surface is warmest. Storms that approach the Hawaiian Islands from the east have historically weakened east of Hawai‘i under the combined influence of unfavorable westerly wind conditions, resulting in large wind shear and cooler sea-surface temperatures. However, natural variability in ocean circulation and atmosphere has allowed potentially destructive storms to reach Hawai‘i from the east. Hurricanes Dot (1959), Iwa (1982), and Iniki (1992) all approached from the south and passed near Kaua‘i. This unusual track requires a breakdown of the semi-permanent ridge of high pressure to the north of the islands, which occurs when a trough of low pressure approaches the island chain from the northwest. Such troughs are generally confined to higher latitudes, except in winter.
Although they occur infrequently, Kaua‘i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands.

![Figure 4.6-1 Natural Hazard Rating for Po‘ipū Coast](http://pubs.usgs.gov/imap/i2761/sections/2_Kaua'i.pdf)

**Seismic**

The Kaua‘i and Ni‘ihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands. Per the 2006 International Building Code (IBC) Seismic Design Map (Figure 1613.5(10)), the project area could experience seismic activity between .20 and .25 of the earth's gravitational acceleration (g-force). This represents the upper limits of probable force experienced by the region during a probable seismic event. According to the USGS, seismic hazards in the Po‘ipū region are low.
Impacts that would be considered significant related to natural hazards could include:

- Damage to facilities or harm to personnel or livestock from natural hazards; and
- Failure to anticipate and plan for protection of the dairy facility and operations from a natural hazard.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet IBC 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

A natural disaster plan has been prepared by the Hawai‘i Dairy Farms’ manager to address hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is mentioned in the disaster plan only for HDF personnel to maintain awareness. The disaster response plan outlines safety procedures during the event, follow up actions, and emergency contacts for assistance before, during or following the event.
The disaster plan relies upon knowledge of cow behavior. Extensive guidance for livestock protection comes from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. Adapting guidance to specific natural disaster threats is the first step in preparing the HDF disaster response plan. Land managers in the Māhā'ulepū region during hurricanes that affected Kaua‘i in 1982 and 1992 observed defoliation of vegetation, and no flooding event in the period following passage of the storms (Killerman, pers. com.).

For the herd at HDF, which will not be confined within structures, the 470 acres of pasture within the valley would provide the best protection. Evacuation off the farm is not planned. Cows sense security in numbers, and prefer to remain within a group (known as a mob, described in Chapter 3). Mobs will be moved to an appropriate group of paddocks based on the threat. Each paddock is equipped with sufficient drinking water troughs for the number of livestock corresponding to paddock size. Once the threat has passed, mobs will be returned to the next scheduled paddock in the mobs’ rotation.

Ditches and culverts will be monitored for blockages or debris dams during high rainfall events. Such debris would be removed to maintain the full capacity of the ditches.

**Short-term Impacts and Mitigation – Natural Hazards**

Emergency procedures for the construction site will comply with Occupational Safety and Health Administration (OSHA), County of Kaua‘i, and State of Hawai‘i safety requirements. An emergency preparedness plan for protection of animals has been prepared for HDF internal use. Construction design will meet IBC standards with local amendments. No short-term significant impacts are anticipated related to natural hazards.

**Long-term Impacts and Mitigation – Natural Hazards**

Geologic and potential natural hazards pose no major constraints to the project. Emergency management procedures and staff training for emergency events will be in place to implement prevention and mitigation should natural hazards occur in the region that may impact the dairy herd or facilities.

There has been no storm event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhā'ulepū Valley (see Section 4.1, Table 4.1-2). The effluent pond capacity for the committed herd size of 699 milking cows has been designed well beyond the regulatory requirements, and would provide nearly 1 million additional gallons of storage. As an additional safeguard, a secondary containment berm with an additional capacity of 1,131,000 gallons – representing more than 85 days of effluent with wash water from the 699 milking cow herd – is included in the design. So there are two stages of storage capacity beyond both the regulatory requirements and any recorded rainfall event over the past three decades.

**4.7 ARCHAEOLOGICAL AND HISTORIC RESOURCES**

The Hawai‘i Dairy Farms project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An archaeological inventory survey (AIS) of the proposed site was conducted in July and August 2014 by Scientific Consultant Services, Inc. The following comes from the findings of the AIS, which is included as Appendix G.
4.7.1 Existing Conditions - Archaeological and Historic Resources

Archaeological Studies

Previous archaeological studies along the Māhā'ulepū coast have identified a number of sites including petroglyphs, human burials, fossils, cultural artifacts, and several heiau. However, despite the vast amount of archaeological information available for the coastal areas, inland studies of Māhā'ulepū — including the project site — are limited. The only site previously identified and given an official State site number was Site 3094, located at the northern end of the valley on land outside of the boundaries of the project area. This site contains a large boulder with about 20 anthropomorphic figures (petroglyphs), two pecked cups, and a long etched groove.

A total of 16 sites were identified during the AIS (Figure 4.7-1). These sites were identified through pedestrian survey of the project area and an extended survey area within 100-meters of the northern boundary. Fifteen (15) of the sites were newly identified during the current survey and one site, State Site 50-30-10-3094, had been previously identified and was again found during this survey. Of the 16 identified sites, 6 sites occur in the project area and 10 sites occur in the extended survey area. One of these newly identified sites offsite is believed to be associated with pre-Contact and/or early historic times, a rectangular rock enclosure (Site 2250) interpreted to be an agricultural heiau. Only one other pre-contact site, the petroglyph boulder, is offsite. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century, all of which are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising, given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Survey and subsurface exploration within a cluster of land commission awards (LCAs) within the valley revealed no historic era cultural materials. LCAs represent land claims by commoners following a change of ownership from ali‘i (Hawaiians of noble descent) to those who had longevity of occupancy.

Historic Period Development

Sugarcane began to be grown and milled commercially in Māhā'ulepū Valley and around Kōloa in the 1820s. In 1835 the Kōloa Plantation, owned by Ladd and Company, was up and running, the first attempt at producing sugarcane commercially. The land was leased for a fifty-year period from Kaua‘i Governor Kaikioewa and King Kamehameha III. The lease was the first of its kind in Hawai‘i and was the first formal recognition that an individual other than a chief could control land use.

The sugar industry grew sporadically between 1845 and 1875. The Hawaiian Government benefited from a reciprocity treaty negotiated towards the end of this period, allowing all unrefined Hawaiian sugar to be admitted into the United States duty free. Kōloa Plantation commenced growing sugarcane in Māhā'ulepū Valley in 1878, a practice that continued for more than one hundred years.

The various parcels around Kōloa went through a succession of owners until 1864 when George N. Wilcox consolidated and purchased all of Māhā'ulepū Valley and coastal lands forming Grove Farm Company. Sugar cultivation in the valley continued through 1996. Since the cessation of sugarcane cultivation, Māhā'ulepū Valley has been the location of ranching (2002) and taro cultivation (2007), the latter conducted by W.T. Haraguchi under lease.
Figure 4.7-1 Archaeological Survey
4.7.2 Probable Impacts and Mitigation Measures - Archaeological and Historic Resources

Impacts that would be considered significant related to archaeological and historic resources could include:

- Disturbance or discovery of archaeologic or historic features during construction; and
- Potential future disturbances of historic sites from on-going dairy operations.

Short-term Impacts and Mitigation – Archaeological and Historic Resources

The findings of the current AIS indicate that portions of the project area were used for agriculture in the period after European contact. No pre-contact cultural sites were identified within the project site boundaries. In the unlikely event that archaeological resources are discovered during construction, appropriate procedures will be followed as required in applicable Hawaiʻi Revised Statutes and regulations, including contacting State Historic Preservation Division.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will contain dairy activities and related impacts within the project area. No short-term impacts are anticipated.

Long-term Impacts and Mitigation – Archaeological and Historic Resources

The sixteen historic properties were assessed for significance by the archaeological consultant. No effect from dairy facility installation or operations is anticipated, and no further archaeological work is recommended for the sites. The two sites considered significant under multiple criteria occur outside the project area. Neither site will be adversely affected by the proposed dairy project.

A majority of the identified sites within the project area were associated with Plantation-era sugarcane cultivation, and will not be adversely affected by the proposed project. Most are in fair to good condition. While representing an interesting time period in the history of the Kūloa-Māhāʻulepū area, no further work is recommended as all relevant information has been gathered from these sites. Adaptive re-use is a possibility, such as use of bridges and culverts. No long-term impacts are anticipated, and no further mitigation is recommended for the project area.

Table 4.7-1 Site Type, Description, and Status

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<td></td>
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<td>-2259</td>
<td>Ditch (2 points: South End and North End)</td>
<td>Out of Project area. No effect; No further work (NFW)</td>
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<tr>
<td>-2258</td>
<td>Reservoir (2 points: South End and North End)</td>
<td>Out of Project area. No effect; NFW</td>
</tr>
<tr>
<td>-2253</td>
<td>Ditch (2 points: West End and East End)</td>
<td>Out of Project area. No effect; NFW</td>
</tr>
<tr>
<td>-2252</td>
<td>Ditch (2 points: West End and East End)</td>
<td>Out of Project area. No effect; NFW</td>
</tr>
<tr>
<td>-2251</td>
<td>Ditch (North End and South End)</td>
<td>Out of Project Area; No effect; NFW</td>
</tr>
<tr>
<td>Site Number 50-30-10-#</td>
<td>Description</td>
<td>Status</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------</td>
<td>--------</td>
</tr>
<tr>
<td><strong>Built Features</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-2252</td>
<td>Sluice Gate</td>
<td>Out of Project area. No effect; NFW</td>
</tr>
<tr>
<td>-2253</td>
<td>Sluice Gate</td>
<td>Out of Project area. No effect; NFW</td>
</tr>
<tr>
<td>-2251</td>
<td>Sluice Gate</td>
<td>Out of Project area. No effect; NFW</td>
</tr>
<tr>
<td>-2257</td>
<td>Retaining Wall</td>
<td>Within Project area. Cows will be excluded from feature by fencing as it lies near waterway. No effect; NFW</td>
</tr>
<tr>
<td>-2254</td>
<td>Retaining Wall</td>
<td>Within Project area. Cows will be excluded from feature by fencing as it lies near waterway. No effect; NFW</td>
</tr>
<tr>
<td>-2261</td>
<td>Bridge</td>
<td>Out of Project Area; No effect; NFW</td>
</tr>
<tr>
<td>-2263</td>
<td>Bridge</td>
<td>No effect; NFW; will be used to cross existing waterway.</td>
</tr>
<tr>
<td>-2255</td>
<td>Culvert bridges (4)</td>
<td>No effect; NFW; will be used to cross existing waterway.</td>
</tr>
<tr>
<td>-2256</td>
<td>Concrete bridge</td>
<td>No effect; NFW; will be used to cross existing waterway.</td>
</tr>
<tr>
<td>-2264</td>
<td>Remnant irrigation pipe</td>
<td>No effect; NFW</td>
</tr>
<tr>
<td>-2260</td>
<td>Bridge (east rail)</td>
<td>Out of Project area. No effect; NFW</td>
</tr>
<tr>
<td>-2262 (TS 16)</td>
<td>Flume System</td>
<td>Out of Project area. No effect; NFW</td>
</tr>
<tr>
<td><strong>PREHISTORIC PERIOD</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-3094</td>
<td>Pohaku w/petroglyphs</td>
<td>Out of Project area. No effect; NFW</td>
</tr>
<tr>
<td>-2250</td>
<td>Enclosure</td>
<td>Out of Project area. No effect; NFW</td>
</tr>
</tbody>
</table>
4.8 CULTURAL PRACTICES AND RESOURCES

Scientific Consultant Services, Inc. prepared a Cultural Impact Assessment (CIA) of the dairy farm and vicinity dated April, 2016. The CIA evaluation seeks to assess traditional cultural practices as well as resources pertaining to the project area within the ahupua’a. This section summarizes the types of traditional practices and cultural resources associated with the proposed project site vicinity. The full CIA is in Appendix H.

4.8.1 Existing Conditions - Cultural Practices and Historic Resources

Traditional Hawaiian Background

Early settlement and agricultural development is thought to have been first established on the windward sides of the Hawaiian Islands sometime in the A.D. 900-1000 range on Kaua‘i during what is known as the Colonization Period. Most likely arriving from east Polynesia, these early inhabitants brought with them a variety of tools, fishing gear, and household goods. Dogs, pigs and chickens were brought by these Polynesian voyagers for food.

Considering that every food crop cultivated by the Hawaiians arrived with them shows a considerable knowledge not only of the planting and harvesting of these crops but the ability to transport their seeds, cuttings, and roots. Prior to European Contact (1778), Hawaiians cultivated taro in both irrigated and dry fields. Other dry land agriculture crops included ‘uala (sweet potato), uhi (yams), mai’a (bananas), ipu (gourds), and kō (sugarcane).

Hawaiian aquaculture was extensive, with the construction and maintenance of coastal and riverine fish ponds. Their fishing ranged from shoreline to pelagic with different strategies for each. In order to maintain and benefit from all of these resource zones, Hawaiian polities were organized into ahupua’a which gave residents access to a wide array of resources extending from mountain top forests to deep sea fishing zones. Ahupua’a boundaries could expand, contract, appear, and disappear, as dependent upon political events. Given the size of Māhā‘ulepū Valley and environs, this ahupua’a was highly valued.

Initial Polynesian settlement of Kaua‘i occurred in the resource-rich regions surrounding Wailua River, on the east coast, the equally verdant Waimea River region on the southern coast, and the Hanalei region on the north coast. Pre-Contact sites have been most commonly identified in coastal or near coastal areas, locations removed from intensive sugarcane production. Initial settlement is presumed near the coastline in the A.D. 1000 to 1200 range, with expansion inland during the A.D. 1400 to 1600s, as was typical across the islands.

In early 1778 Captain James Cook and the two ships under his command, H.M.S. Resolution and H.M.S. Discovery arrived off of Kaua‘i. Finding that they could not make land fall at Wailua, Cook continued westward until reaching Waimea. This would be the beginning of contact between Europeans and Hawaiians. After the death of Cook in 1778, the journey continued, now under the command of Captain Clerke. After their departure a short time later, it would not be until 1786 that Europeans returned to the Hawaiian Islands, with Waimea (Kaua‘i) receiving her share of British and American vessels focusing on the lucrative fur trade in the Pacific Northwest.
Beginning in approximately 1790, battles between several rulers on occurred and around Maui, Moloka‘i, and Hawai‘i Island with increasing ferocity. After two unsuccessful efforts that failed in 1796 and 1804 due to storms and smallpox respectively, in 1810 King Kamehameha I used diplomacy, suggesting that he rule the eastern islands in name and deed, while the ruler of Kaua‘i, King Kaumualii, acknowledge his suzerainty but continue to rule Kaua‘i and Ni‘ihau. It was agreed that the arrangement would end with the death of Kaumualii and that rule would then pass to the heirs of Kamehameha.

This arrangement lasted between 1810 and 1822. It endured the death of Kamehameha the Great in 1819. During these 12 years, Kaumualii solidified rule of his kingdom and engaged in efforts to gain foreign weapons and support from the Russian Fur Company. Also during this time, the trade in sandalwood flourished. Harvested in the Hawaiian Islands, traded for goods to European and American captains, and sold in the Chinese trade ports of Macao and Canton, sandalwood became the first Hawaiian cash crop. The independent rule of Kaua‘i came to an end in 1824 with the death of Kaumualii. This same year, the heir of Kamehameha, Li‘iholii Kamehameha II also died. The kingdom of Hawai‘i would now be ruled by Queen Ka‘ahumanu. Ka‘ahumanu ruled as Regent until her death in 1831.

A daughter of Kamehameha, Kīna‘u, took over as regent until 1834 at which time Kauikeaouli Kamehameha III took the throne. He had lived on Kaua‘i as a boy but had spent the majority of his youth on O‘ahu. Ruling until his own early death in 1854, his reign was admirable for its civil rights, efficiency, and the creation of the Great Mahele, by which land awards to commoners and granting ownership to the disenfranchised was achieved. In Māhā‘ulepū, there were many Land Commission Awards, but the majority of the acreage was retained by the government. In 1831, the heir of Kamehameha, Liholiho Kamehameha II also died. The kingdom of Hawai‘i would now be ruled by Queen Ka‘ahumanu. Ka‘ahumanu ruled as Regent until her death in 1831.

Traditional and Historic Land Tenure and Use

The Māhele was a drastic change in the lives of Hawaiians. Commoners, also known as maka‘ainana, had for centuries been allowed use, but denied ownership, of the lands they worked. This changed in the late 1840s when private ownership of lands was made into law. Certainly ali‘i, or nobles, had the better of the deal, but commoners were allowed to claim, through right of labor and longevity of occupancy, LCA. Many of LCAs for Māhā‘ulepū are tightly clustered within the ‘ili of Kawailoa, which is within the current project area. There is a cluster east of Māhā‘ulepū Ditch near the center of the valley. The remainder of the valley was deemed government land. Thus, no LCAs occur elsewhere in the project area or the extended survey area.

The Governor of Kaua‘i in 1842 was Keakaono, the granddaughter of Kamehameha. During her governorship she partook in land exchanges, consolidating her grants in Māhā‘ulepū and Kōloa. These consolidated lands would become the basis for the next cash crop, one that could be rejuvenated and continued, unlike sandalwood. From the 1830s until the 1990s, sugar would be the economic focus of Māhā‘ulepū. Remnants of industrial-level sugarcane cultivation in the area represent the greatest number of historic properties documented during the current AIS study.

That the entire valley (including the project area) was under intensive sugarcane cultivation is evidenced by the infrastructure put into the valley through time. Early 20th century maps also document the extent of the fields throughout the Kōloa area, showing the entirety of the current project area consisted of sugarcane lands.
4.8.2 Probable Impacts and Mitigation Measures - Cultural Practices and Historic Resources

Impacts that would be considered significant related to cultural practices and resources could include:

- Isolation of cultural resources from their setting; and
- Introduction of elements that may alter the setting in which cultural practices take place.

Short-term Impacts and Mitigation – Cultural Practices and Resources

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs. Information received from the community indicates the Māhā‘ulepū ahupua‘a has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. Gathering of plants and marine resources, and two known State sites are outside the project area: State Site 50-30-10-2250, the agricultural heiau; and State Site 50-30-10-3094, a carved petroglyph boulder. No significant cultural sites occur within the HDF site.

No change to current cultural practices within the Māhā‘ulepū ahupua‘a will occur from dairy establishment or operations.

Long-term Impacts and Mitigation – Cultural Practices and Resources

The perception of most community members interviewed was that the dairy may have indirect and direct negative impacts on the environment in the area. This EIS analyzes potential environmental impacts, which are summarized in Section 4.27.

The findings of research related to preparation of the Cultural Impact Assessment for the dairy site, including interviews of community members, states that it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

4.9 FLORA

A botanical survey of the dairy property was conducted by Eric Guinther (August 2014) to assess the existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened or proposed for listing under Federal or the State of Hawai‘i’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The findings of the assessment are included in Appendix A.

4.9.1 Existing Conditions - Flora

The Hawai‘i Dairy Farms project site is proposed for an area currently in pasture. The pastures vary between recently cultivated and various states of weedy regrowth. No active grazing was observed at the time of the survey (July 2014). A small herd of cows (*Bos taurus*) were seen within a paddock beyond the east side of the property. Consequently, while many of the pastures are a mix of open ground and weedy growth, others are densely overgrown with grasses and other herbaceous plants. Trees are few and scattered, mostly along waterways on the property. Along the edges of the survey area, on the east, north, and west, the sloping land is forested. Since nearly all of the forest is out of the survey area, it was visited at numerous points along the margin but not entered for any significant distance (generally only as far as the old plantation ditch which extended around the valley edge). The vegetation within the project area is herbaceous and typical of regularly disturbed land (i.e., agricultural).
In all, 115 species of plants were identified from various parts of the survey area. Only five of these (or 4.3 percent) are species native to Hawai‘i, and all of those are considered indigenous (found in Hawai‘i and other Pacific Islands, as opposed to endemic species that are unique to the Hawaiian Islands). All of the remainder (110 species) are introduced plants that have become naturalized, with the exception of one introduction that is regarded as an ornamental plant.

A somewhat unusual aspect of the flora is the abundance of a number of weedy herbaceous dicots in the fields. Species, such as false ragweed (*Parthenium hysterophorus*), kikāna (*Xanthium strumarium*), little bell (*Ipomoea triloba*), fuzzy rattlepod (*Crotalaria incana*), sensitive plant (*Mimosa pudica*), and prickly sida (*Sida spinosa*), are especially abundant covering large areas of relatively recently disturbed pastureland. Guinea grass (*Urochloa maxima*) and California grass (*Urochloa mutica*) are dominant in areas where the pasture has not been disturbed recently by tilling or ungulate browsing, and are abundant mixed with the dicot herbs just mentioned. There are also pasture areas where other species of grass predominate.

Five indigenous species were identified in the botanical survey. These include the ‘ilima (*Sida fallax*), a common short-stature shrub, moa (*psilotum nudum*), a ground cover fern, ‘uhala (Waltheria indica), a short-stature shrub, hala (*Pandanus textorius*) a medium to large size shade tree, *Cyperus polystachyos*, a short-stature shrub, and *Fimbristylis dichotoma*, a grass-like plant that grows in/around water features.

The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. The results of the survey substantiate this prediction. Only four percent of all plants recorded during the survey were native, indicating that only species adapted of constant disturbances can survive. With but a few exceptions, these adapted species are non-natives in the lowlands of the Hawaiian Islands.

A search of Bernice P. Bishop Museum Herbarium records conducted by Anita Manning, yielded 91 entries for “Māhā’ulepū”. The majority of the natives in the listing were collected along the coast or “Hāʻupu Ridge” or “Pu‘u Pihakapu”. The list of rare native species is impressive, and though the locations are associated with Māhā’ulepū Valley, the habitats represented are vastly different from those of the valley floor where the dairy would be located. Indeed, all of the plants of interest were collected in either coastal dunes, exposed coastal sites, or the steep, rocky cliffs at elevations well above the site. All species in the collection with locations likely to be similar to, if not in, the project pasture lands, are non-native species.

An endangered native plant, ‘ōhai (*Sesbania tomentosa*, a shrub in the pea family), is typically found in dry, coastal areas below 2,500 feet elevation. Destruction of its natural habitats has greatly reduced natural occurrence Statewide. According to the National Park Service Māhāʻulepū, Island of Kaua‘i Reconnaissance Survey (2008), the U.S. Fish and Wildlife Service has designated Critical Habitat along the entire Māhāʻulepū shoreline for the endangered ‘ōhai. No suitable habitat for the ‘ōhai plant exists on the dairy site.
4.9.2 Probable Impacts and Mitigation Measures - Flora

Impacts that could be considered significant related to flora could include:

- Disturbance or displacement of native vegetation and native habitats, or flora with State or Federal status as threatened or endangered; and
- Long-term degradation of native habitat or flora on site as part of on-going dairy operations.

Short-term Impacts and Mitigation – Flora

Native plants with potential to stabilize banks will be encouraged and supplemented if needed to enhance the planned buffer strips along drainages (Section 4.17.2, Surface Water Quality). No threatened or endangered plants occur on the project property. Only 5 of the 115 plant species recorded during the survey were native, and no intact native habitat exists. Construction of the dairy farm is not expected to result in adverse impacts to native plants.

Long-term Impacts and Mitigation – Flora

Vegetated buffer strips along the drainageways are part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plants species will occur as a result of the dairy.

4.10 FAUNA

Avian and mammalian surveys were conducted by Rana Biological Consulting, Inc. (August 2014). This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or State endangered species lists. The survey covered the dairy site area and immediate vicinity. The results of the survey are included in Appendix A.

4.10.1 Existing Conditions - Fauna

A total of 1,070 individual birds of 31 species, representing 23 separate families, were recorded during station counts. Of the 31 species detected during station counts, seven were native species. Four of the native species are listed as endangered under both Federal and State of Hawai‘i: Nēnē (Branta sandvicensis), Hawaiian Duck (Anas wyvilliana), the Hawaiian sub-species of the Common Gallinule (Gallinula galeata sandvicensis) and Black-necked Stilt (Himantopus mexicanus knudseni). The remaining three native species detected during point counts, Black-crowned Night-Heron (Nycticorax nycticorax hoactli), Pacific Golden-Plover (Pluvialis fulva), and Wandering Tattler (Tringa incana) are indigenous species. The heron is an indigenous resident breeding species and the plover and tattler are indigenous migratory shorebird species. An additional endangered endemic species, Hawaiian Coot (Fulica alai) was recorded as an incidental observation while transiting from one count station to another. The remaining 27 avian species detected are alien to the Hawaiian Islands.

Avian diversity and densities were in keeping with the location of the property and the habitats presently on the site. Four alien species, Zebra Dove (Geopelia striata), Cattle Egret (Bulbucus ibis), Common Myna (Acridotheres tritis) and Japanese White-eye (Zosterops japonicus) accounted for 52 percent of all birds recorded during station counts. The most commonly recorded species was Zebra Dove, which accounted for 18 percent of the total number of individual birds recorded. An average of 38 individual birds was recorded per station count, a number that is relatively high for a lowland site on Kaua‘i.
Six terrestrial mammalian species were recorded on the site. A small herd of cows (*Bos taurus*) were seen within a paddock just beyond the east side of the property. Flocks of recently shorn sheep were present within the taro farm, which is located within the dairy property, but is not part of the dairy farm. All other species identified in the survey are listed in Appendix A. No mammalian species proposed for listing, or listed as endangered or threatened under either Federal or State of Hawai‘i endangered species statutes, was recorded during the course of this survey (DLNR 1998; USFWS 2014).

### 4.10.2 Probable Impacts and Mitigation Measures - Fauna

Impacts that would be considered significant related to fauna could include:

- Disturbance or displacement of endangered species habitat during construction; and
- Long-term disruption of fauna on site and nearby as part of on-going dairy operations.

**Short-term Impacts and Mitigation – Fauna**

There is no critical habitat for endangered species in the upper Māhā‘ulepū Valley. Four species of endangered waterbirds have been recorded on the site, though the area does not provide critical habitat. Seabirds that nest in upland areas of Kaua‘i may overfly the site; outside lights used at night will utilize shades to protect against uplighting to prevent possible disorientation of the birds.

Short-term impacts for waterbirds and seabirds could be posed by construction activities, such as clearing and grubbing, which have the potential to disturb nesting waterbirds, nests, eggs and young. There also is the potential for interactions between endangered waterbirds and construction equipment, vehicles and construction personnel. Waterbirds disturbed when nesting may abandon their nest, eggs and to a lesser degree chicks. Nēnē nest in the general Kōloa area, and the habitat present on parts of the site is suitable for nēnē nesting. Potential impacts to this species are similar to those discussed for waterbirds, though nēnē may utilize areas far from water to nest, if adequate shrubbery exists. Increased vehicular traffic associated with construction activities also increases the risk of birds being run over or hit by vehicles, within the dairy site.

Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to protect specified areas, marking tall structures and fencing with white visibility polytape, limiting nighttime lighting, and shading any outside lights used at night.
During the construction phase and throughout day-to-day operation of the dairy farm, the following measures and training are recommended to ensure that construction activities do not result in deleterious impacts to the birds that may be encountered during construction.

- Develop an endangered species awareness training module
- Provide endangered species awareness training to construction and other workers prior to starting work
- Prepare Endangered Species Identification references with photographs, description of habits, and likely areas on the property where they are most likely to occur and/or to nest
- Have qualified biologist survey for nesting waterbirds and nēnē immediately prior to construction activities. Halt activity if nesting activity is identified within 100 feet of construction until nesting activity has ended. Alternately, consult with State or Federal wildlife regulators to determine the best course of action
- Post 15 mile per hour speed limit signs and enforce on all roads within the project
- No pets allowed on property – especially dogs and cats
- Provide closed trash receptacles for all personnel and visitor food and provide for disposal
- Enforce no feeding of any birds
- Designate construction personnel parking areas
- Survey and delineate construction materials and equipment parking and maintenance areas
- Include the above as contract provisions and in construction best management practices
• If nighttime construction activity or equipment maintenance is proposed during the construction phases of the dairy farm, all associated lights should be shielded, and when large flood/work lights are used, they should be placed on poles that are high enough to allow the lights to be pointed directly at the ground.
• All outdoor lights installed as part of the project will be shielded to reduce the potential for interactions of nocturnally flying seabirds with external lights and man-made structures (Reed et al., 1985; Telfer et al., 1987).
• Maintain traps with or without baits to capture feral cats or rats that may harm waterbirds or nēnē transiting or using the HDF site.

Long-term Impacts and Mitigation – Fauna

The impacts described for the dairy construction period for the four waterbird species and seabirds potentially overflying the area would be similar for long-term dairy operations. Additionally, operation of the dairy may attract higher densities of mammalian predators such as cats, dogs and rats. On many dairy farms the increased number of rodents drawn to feed, silage and waste treatment areas is usually alleviated by encouraging cats within the facility to assist in the control of rodents. The increase in either or both of these predators would pose heightened risks to nesting Nēnē and protected waterbirds, nests, eggs and their young.

It is likely that Hawaiian hoary bats overfly the project area on a seasonal basis. The principal potential impact that the development of the proposed dairy farms poses to bats is during the clearing and grubbing phases of construction as vegetation is removed. The removal of vegetation within the project site may temporarily displace individual bats, which may use the vegetation as a roosting location. There are very few mature trees on the dairy farm site, which is the habitat preferred by hoary bats as roosting locations. As bats use multiple roosts within their home territories, the potential disturbance resulting from the removal of the vegetation is likely to be minimal. During the pupping season (June to September), females carrying their pups may be less able to rapidly vacate a roost site as the vegetation is cleared. Additionally, adult female bats sometimes leave their pups in the roost tree while they forage. There are almost no suitable roost trees within the dairy site; therefore, no effect to bats is expected from that the dairy farm.

Following build-out and the start of Dairy operations, the following mitigation strategies will be implemented:

• Develop an Avian Species Protection Plan; the plan would include all of the topics outlined above. The material would be presented in more detail and with the rationale for why following those best management practices is necessary to ensure that dairy operations would not result in deleterious impacts to protected wildlife. The Plan would also include these additional topics:
  • Prepare Endangered Species Identification references with photographs, description of habits, and areas on the property where they are most likely to occur and/or to nest
  • Employee endangered species training, provided both in writing and as a PowerPoint presentation for use in training new personnel and annual updates of training
  • Predator control program
  • Downed seabird, and injured waterbird response protocols
4.11 INVERTEBRATE SPECIES AND PEST INSECTS

A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist (January 2016). The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhāʻulepū area, as well as the parasites and predators on site that control those species. Fieldwork was conducted September 15-16, 2014. The full report is in Appendix B.

4.11.1 Existing Conditions – Invertebrate Species and Pest Insects

Beneficial insects include primary decomposers such as earthworms and dung beetles, and pollinators including bees. Pest insects are those that can negatively impact livestock health and production, such as flies. An invertebrate study of manure-associated insects was conducted for the EIS. The study included a field survey that used manure from an adjacent beef cattle herd as a lure, and determined flies and other manure-related insects currently present at the HDF site. Two common flies, the stable fly and the horn fly, were identified. Both of these flies are widespread throughout the Hawaiian Islands. The greenbottle fly was reared from manure taken back to a laboratory following the field survey. Additionally, flies known to exist on Kauaʻi but not seen at the HDF site during the survey are identified and include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations.

The stable fly is so named due to its association with the manure of horses and cattle, but it can breed in rotting vegetation including beach seaweeds. The adult stable fly prefers to land on animals’ legs, causing annoyance as they feed on the blood of livestock. As with most insect pests associated with livestock, this annoyance causes stress and loss of operational productivity. The stable fly may bite humans nearby. The horn fly has been widespread in the Hawaiian Islands since 1898; Kauaʻi herds have benefitted from control by parasitic micro-wasps and introduced dung beetles that reduce larvae breeding in dung. The horn fly causes pain and annoyance to cattle, but rarely bites man. The greenbottle fly was not observed on site but did hatch from manure brought back to a laboratory setting following the survey. This fly cannot bite or sting (Montgomery, 2016).

Twenty species of predators and competitors to the horn fly were successfully established in Hawaiʻi between 1898 and 1985. Research shows that 95 percent fewer horn flies emerged from dung patties containing a beetle species that has been identified at the HDF site. Proven control methods for the stable fly include parasitic micro-wasps and spreading out manure (DuPonte and Larish in Montgomery, 2016). Among the invertebrates introduced to combat livestock-related flies are extremely tiny parasitic wasps that prey on various fly species. The adult wasps could be described as the size of gnat. Using an ovipositor – described by lay people as a “stinger” – the female lays eggs in the larvae or pupa of flies. The male wasp has no such “stinger”. See Figure 4.11-1 a – c.

![Figure 4.11-1 Parasitic Wasp Introduced to Hawaiʻi](image)
No native invertebrates of any species are attracted to manure of large herbivores. As deer, goats, cattle, pigs, and horses were not present in pre-human Hawai‘i, native invertebrates did not evolve to use large, wet manure piles as habitat or food (Montgomery, 2016). No Federally or State listed endangered or threatened invertebrate species were noted in a survey (Montgomery, 2016). The project location does not provide any habitat for *Drosophila musaphilia*, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened (USFWS 2008). Native *Drosophila* habitat is located many miles away in the high elevation koa-‘ōhi’a forests.

Bees are an essential part of the agricultural ecosystem. Honey bees (*Apis mellifera*) were observed at the watering trough for the Māhā‘ulepū Cattle Co. stock and on the dairy farm overhead pivot irrigation system. It is to be expected that honey bees will visit any water source set up for the dairy herd. Recent declines in honey bee populations in the wild on O‘ahu and Hawai‘i Island are due to accidental Varroa mite introductions and a souring beetle that ferments its nectar in bee hives (Montgomery, 2016). While neither has been reported on Kaua‘i, State quarantines are currently in place to minimize spread of the mites and help protect local bee populations.

Sheep are kept near the Haraguchi Farm kalo ponds to graze for weed control. The pellet-sized manure of sheep is structurally quite different from that of cattle and does not support the same invertebrate species.

Some illegal dumping of household trash is known to occur in the area. The anonymity provided by locations such as the country roadsides in the vicinity of the dairy farm make it a convenient place to drop trash. Bags of trash containing food remains may be dumped, and this household trash sitting in the open is a recognized fly breeding habitat (Ikeda et al. 1973).

Kōloa Lava Tube System. There are no known caves or lava tubes found on or adjacent to the dairy farm property. The known caves in the vicinity are approximately 0.75 mile from the closest point to the dairy farm. Several miles away from the dairy farm property is the Kōloa Lava Tube System, which provides habitat for two endemic cave species, the Kaua‘i Cave Wolf Spider and the Kaua‘i Cave amphipod. Both invertebrates are listed as endangered under the U.S. Endangered Species Act. Not all caves in the Kōloa area contain these animals. Per the 2006 U.S. Fish and Wildlife Service (USFWS) Draft Recovery Plan for Kaua‘i Cave Species, most caves in the Kōloa District do not contain the optimal climatological conditions required by these organisms. Continued development for housing and tourism is described by the USFWS (2006) as potentially leading to the destruction of remaining cave habitats in the area.

### 4.11.2 Probable Impacts and Mitigation Measures

Impacts that would be considered significant related to invertebrate insects and pest species could include:

- Disturbance or displacement of protected or endangered insects; and
- Inadvertent introduction of non-native species not known to Hawai‘i, or an increase in pest populations.

**Short-term Impacts and Mitigation – Invertebrate Species and Pest Insects**

There are no native, protected or endangered insect species within the HDF site. Construction will not impact any endangered invertebrate populations. It is possible that flies known from elsewhere on the island, associated with areas containing high pet populations, could be inadvertently transferred the HDF site and possibly utilize cow manure as a food source.
To minimize potential establishment of pest flies or other insects, food waste generated during the construction phase will be bagged, covered, contained and disposed of in order to limit possible breeding habitat for flies. Inspections of building materials for ants or other insects will be conducted to prevent introduction of new pests to the HDF site.

Long-term management for pests (explained in the following) relies on a natural food web cycle that will expand as the habitat (manure) is increased. In the short-term, supplemental pest control using mechanical and chemical methods may be used to prevent any spike in pest populations. Mechanical methods include sticky tapes or ribbons that could be used in the milking parlor or covered areas of the dairy facility. Traps will be used as needed for both monitoring and removal of flies. Traps can use attractants or not; versions designed for use outdoors could be used in paddocks from which cows are excluded (those not being actively grazed). Chemical methods may be used to prevent short-term spikes in pest populations. Insecticides and herbicides are non-discriminatory and kill beneficial as well as pest insects. Such control would only be used when needed by those qualified to apply chemicals, and in accordance with authorized procedures and regulatory labeling requirements.

Long-term Impacts and Mitigation – Invertebrate Species and Pest Insects

Integrated pest management utilizes knowledge of the ancient food web among species. Disrupting reproduction of potential pests with appropriate means at key points in the life cycle has been used in Hawai‘i for decades (Figure 4.11-2). Extensive introduction of dung beetle species between 1898 and 1985 in response to cattle-related insect pests resulted in 14 dung beetle species becoming established on Kaua‘i. Cattle egrets, a bird species introduced to Hawai‘i in the late 1950s to control cattle-associated insects, break up dung patties while searching for prey (Figure 4.11-3).

Dung beetles speed incorporation of the manure into the soil by breaking up bovine manure pats and transporting the organic material into the soil. A healthy population of dung beetles can bury a dung pat in one to three days. Breaking up and burying the dung patty destroys the habitat for insects such as flies to complete their life cycle. The stable fly requires approximately 21 days within the dung patty for the immature life stage (egg to pupa) to survive. The house fly takes 7 to 10 days from egg to fly, and can use a number of damp, decaying material as habitat. The horn fly takes 10 to 20 days from egg to adult.
The behavioral diversity among dung beetle species working together can bury dung pats in one to three days. Some beetle species fly at night and some during the day; some prefer older manure over fresh. HDF and other ranchers on Kaua‘i may choose to engage with the State Department of Agriculture to translocate dung beetle species already introduced on Kaua‘i to Māhā’ulepū and other areas if manure-related flies become a problem (Figure 4.11-2).

HDF will not maintain any populations of dogs, cats or chickens at the dairy, and will discourage feral pigs and the island’s wild jungle fowl. These domesticated or feral animal populations could provide dung that facilitates breeding of several species of flies not currently established on site. Proper disposal of dog and cat feces is important. Chicken feces can accumulate in sufficient amount to provide a location for fly breeding. While feral chickens are common throughout Kaua‘i, HDF will diligently clean any spilled feed or other potential attractants to keep chickens away from the dairy facility.

Good housekeeping is an important tool in controlling establishment of most flies. Human food waste from on-site workers’ meals would be disposed of in a covered, lined container and removed from the site often. Any spilled or waste supplement foods for the cattle should not be allowed to become wet and stay exposed. Rotting food waste can provide attractive habitat for fly breeding, therefore food waste must be disposed of properly. HDF personnel would be alert for bags along the roads around the property and remove them if practical. If left, the trash bags could breed flies that would then migrate to the nearest habitat of interest – the cattle manure.

Haraguchi Farm must also maintain the health of its sheep, as cows and sheep can share health issues. Of special concern should be the sheep bot fly (Oestrus ovis) that rarely can pass to cattle. This pest attacks by laying eggs that produce maggots in eyes and nasal passages.

Bees are an essential part of any agricultural ecosystem. It is expected that honey bees will visit water sources set up for the HDF herd. A ‘ramp’ will be built into any open water source to allow bees some chance of swimming to an escape rather than drowning. A struggling bee, floating in the tank, lapped up by a drinking cow could sting by reflex. A scoop or sieve will be used to remove bees before stock access the drinking area. The bees should be disposed of safely as the stingers of even a dead bee will function if pressure is exerted. Also, safe application practices for any unavoidable herbicide or pesticide will be utilized to narrowly target the correct pest species without harming other insects and animals in the area. Anyone using herbicides or pesticides will be properly trained and informed, and if a honey bee colony location appears to be a danger to workers or cattle, or to be in danger itself, a local beekeeper will be contacted for advice and removal (Montgomery, 2016).

Neither the botanical and faunal survey nor the invertebrate survey revealed any evidence of lava tubes or caves on the property, and no such features have been reported for the area in the near surrounds of the HDF site. Thus no cave invertebrate species will be affected by the dairy farm. The known habitat in the Kōloa region for the endangered cave spider and amphipod is several miles away, with no reported connection to the dairy farm site. Integrated pest management measures employed to reduce cattle-associated pest fly species at this site will not affect native flies (Drosophila), as the habitat for this species is high elevation koa-ōhi’a forests located miles away.

The dairy operation is not expected to impact any endangered invertebrate populations. HDF will minimize populations of any pest insects such as flies, which already exist on the island of Kaua‘i.
4.12 NOISE

Acoustic conditions (noise) in the area of the dairy farm and surroundings are evaluated in this section. The anticipated short-term and long-term noise conditions associated with the dairy farm and planned mitigation actions are discussed.

4.12.1 Existing Conditions - Noise

Noise can be defined as unwanted sound, a sound that is considered loud or unpleasant, and/or sound that causes disturbance. Research related to noise and livestock focuses on noise levels and minimization of unexpected sounds that caused stress to cows. Noise stress results in loss of livestock productivity and thereby financial loss to farmers and ranchers. Little research exists on the sound levels from livestock.

Sound is measured in decibels (dB). The State of Hawai‘i Department of Health rules use the A-weighting sound network (dBA) in the HAR §11-46, Community Noise Control. Sound through the air is similar to ripples on a pond of water. In open space without reflection, ripples spread uniformly in all directions and decrease in amplitude further from the source. In free field conditions such as outdoors, amplitude drops by half as distance doubles (OSHA, 2016). When sound passes close to absorbing ground cover such as grassland and fields, the "soft ground" absorbs extra sound as it passes.

Typical dBA of conversational speech is 60 dBA; the sound of a shower or vacuum cleaner is roughly 70 to 75 dBA. The OSHA standard for protection against the effects of noise exposure allows an 8-hour duration at 90 dBA before a hearing conservation program is required for employees.

The HDF site in Māhā‘ulepū Valley is 1.5 to 2.5 miles from resort and residential areas on land zoned for agricultural use. Typical noise currently generated near the HDF site is truck ingress/egress along private farm roads, agricultural equipment, and cattle and sheep.

4.12.2 Probable Impacts and Mitigation Measures

Impacts that would be considered significant related to noise could include:

- Increased noise levels during construction; and
- Noise levels that interfere with human activities at home, work or in schools, or that is injurious to people's health and well-being.

Short-term Impacts and Mitigation – Noise

Construction work at the project site will involve activities that may generate an increase in noise levels. Noise related to construction will be a short-term condition, occurring during daylight hours.

Construction vehicles and activities must comply with HAR §11-46. A permit is required for construction activities that emit noise in excess of 78 decibels or that cost a total of more than $250,000 (based on the value on the building permit).

Construction noise is anticipated to be short-term, and will be minimized through application of best management practices to include the use of mufflers to suppress loud equipment and limitations on the hours of heavy equipment operation.
Long-term Impacts and Mitigation – Noise

The dairy farm will utilize milking equipment contained in the milking parlor, and will use field equipment such as tractors. Equipment will typically be used during daylight hours. Dairy operations will comply with applicable noise control ordinances. Under HAR §11-46, agriculture is classified as Zoning District Class C, which specifies maximum permissible sound levels of 70 dBA in the daytime and 70 dBA at nighttime. Maximum permissible sound levels apply to any point at or beyond the property line, and are not to be exceeded more than 10 percent of the time within any 20 minute period.

Dairy operations will generate noise in keeping with agricultural zoning of the parcel. The primary noise receptors in the area would be farmers working nearby parcels. Noise from the dairy will not exceed the DOH threshold, and will not contribute to excessive noise in the region.

4.13 HAZARDOUS SUBSTANCES

This section summarizes a search of State and Federal public records for known hazardous waste on the dairy property. The use and storage of regulated materials for dairy operations is also documented.

4.13.1 Existing Conditions – Hazardous Substances

State of Hawai‘i. The State DOH Solid and Hazardous Waste Branch regulates the generation, treatment, storage, and disposal of hazardous waste. Underground storage tanks (UST) that store petroleum or pesticides are commonly found on agricultural lands. A search of the State’s UST list, last updated September 4, 2015, show no USTs on the dairy parcels (DOH, 2015).

The DOH Hazard Evaluation and Emergency Response (HEER) office provides leadership, support and partnership in preventing, planning for, responding to, and enforcing environmental laws relating to the release or threats of releases of hazardous substances. Former agricultural operations resulted in soil contamination on sites across the island of Kaua‘i. Site-specific facilities, sites or areas in which HEER has investigated or may investigate are tracked in the public records accessed through the HEER website. The HEER Emergency Response Lookup Spreadsheet (updated 12/2/2014) revealed no sites within the HDF site.

Review of the historical sources for the property site – topographic maps and aerial photos - show no pesticide mixing or storage facilities on the HDF site or surrounding areas.

Federal Database. None of the dairy farm parcels are listed for action in the Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) information systems database. CERCLA is commonly referred to as the “Superfund” program. The database tracks the location of identified abandoned hazardous waste sites. No such sites exist within or adjacent to the dairy parcels.

According to the database provided by HEER, no Brownfield sites have been identified within or adjacent to the parcel by Federal, State or County agencies. A Brownfield property is any real property that may be contaminated and is not being used to its full potential. The State’s HEER office works with prospective purchasers and developers to clean up properties under available CERCLA programs.

Review of State and Federal public records for the island of Kaua‘i show no reports of petroleum, hazardous substances, pollutants or contaminant releases at the dairy farm site.
4.13.2 Probable Impacts and Mitigation Measures – Hazardous Substances

Impacts that would be considered significant related to hazardous substances could include:

- Production or run-off of hazardous substances during construction; and
- Long-term purposeful or inadvertent introduction or seepage of hazardous substances to soils or waters from on-going dairy operations.

**Short-term Impacts and Mitigation – Hazardous Substances**

Construction equipment operations at the dairy farm will involve the use of fuels and lubricants. Construction operators will conduct operations in compliance with State and Federal laws to properly manage the use and storage of fuels, lubricants and cleaning to avoid the release of hazardous materials.

No significant short-term impacts related to hazardous substances will occur.

**Long-term Impacts and Mitigation – Hazardous Substances**

Establishment of pasture and on-going cultivation of the robust grass that will provide dairy cows with the majority of their food source will include use of commercial fertilizer to support sufficient grass yields. Herbicides will be used judiciously where needed to control pasture weeds. Flies inhibit productivity on a dairy farm. An integrated pest management program will be employed, with primary control focused on eliminating breeding sites and maintaining a natural predator-prey cycle among invertebrates (see Section 4.11, Invertebrate Species and Pest Insects.).

Healthy cows are a priority for HDF, and antibiotics as prescribed by a licensed veterinarian may be used from time to time, to ensure cows remain healthy and are treated humanely. Guidelines set by Food and Drug Administration (FDA) will be followed to avoid any antibiotic adulteration of milk. Additionally, HDF will routinely conduct laboratory tests on milk for any trace of antibiotic residue. HDF will not treat cows with bovine growth hormones (rBST or rBGH).

Equipment operations at the dairy farm require fuels and lubricants. An emergency power generator with associated fuel storage will be available to power the milking parlor and other critical operations in the event of an electrical outage. Off-road diesel fuel and unleaded gasoline for use in farm vehicles will be stored in two above-ground exterior tanks. Hydraulic fluid and motor oil, to be delivered from a local fuel supplier, will be retained in 55-gallon drums. Brake and transmission fluids and all-purpose grease, will be maintained in the original containers. All containers and drums will be stored within appropriately designed secondary containment areas.

Pesticides, herbicides, fuels and lubricants will be stored according to regulations. Products will be locked within the implement shed when not in use, and segregated by type and per regulations. Fertilizers will be stored in original packaging as delivered by the supplier. Herbicides, pesticides and veterinarian-prescribed medicines will be stored in a separate, locked area under the direct control of the dairy manager or delegate.

No significant long-term impacts will occur from hazardous substances related to dairy operations, due to minimization of risk, secondary containment, and compliance with best management practices.
4.14 PUBLIC SERVICES

4.14.1 Fire Department

Existing Conditions - Fire Department

The County of Kaua‘i Fire Department services the entire island of Kaua‘i. The closest fire station to the dairy is located in Kōloa, approximately 4.5 miles to the west.

Probable Impacts and Mitigation Measures - Fire Department

The dairy farm facilities will be built in compliance with County building and fire codes. Dairy facilities and dairy operations are not anticipated to place a significant demand on fire protection services. Fire suppression and fire safety training requirements for the facilities will be satisfied in consultation with the Kaua‘i Fire Department. There will be no significant short-term or long-term impacts anticipated on fire department services as a result of this project.

4.14.2 Medical

Existing Conditions - Medical

The nearest medical facility is located at Wilcox Memorial Hospital in Līhu‘e, 16.5 miles northeast of the dairy farm location.

Probable Impacts and Mitigation Measures - Medical

Dairy employees may infrequently require service at the local medical facility. Such use is not anticipated to adversely affect the service capacity of Wilcox Memorial Hospital. There are no significant short-term or long-term impacts anticipated on medical services as a result of this project.

4.14.3 Police

Existing Conditions - Police

The County of Kaua‘i Police Department provides police services for the entire island. The closest police substation to the dairy is located in Kōloa, approximately 3.5 miles away.

Probable Impacts and Mitigation Measures - Police

The dairy operations will not impact police service in the area. There are no significant short-term or long-term impacts anticipated to police services as a result of this project. Therefore, no mitigation will be required.

4.14.4 Educational Facilities

Existing Conditions - Educational Facilities

A number of public and private elementary, middle schools, high schools, and a community college are located throughout the neighboring Kōloa and Līhu‘e regions. These schools include Kalaeo
Elementary, Kōloa Elementary, Holy Cross School, 'Ele'ele Elementary School, Kamehameha Schools, Island School, Olelo Christian Academy, Chiefess Kamakahelei Middle School, Kawaihē Public Charter School, Kaua'i High School, and Kaua'i Community College.

Probable Impacts and Mitigation Measures - Educational Facilities

The dairy farm operations will not impact local educational facilities. Employees of the farm may have children attending local schools. Education programs will be established for local schools to learn about the pasture-based dairy operation and food sustainability. No mitigation measures will be required. There are no significant short-term or long-term impacts anticipated to educational facilities as a result of this project.

4.14.5 Libraries

Existing Conditions - Libraries

Public libraries located in proximity to Hawai‘i Dairy Farms include the Kōloa Public and School Library and the Līhu‘e Public Library.

Probable Impacts and Mitigation Measures - Libraries

The dairy will not affect the local public library system. There are no significant short-term or long-term impacts anticipated to libraries as a result of this project. No mitigation will be required.

4.15 DEMOGRAPHIC AND ECONOMIC CONDITIONS

Analysis of impacts examine the ways in which the existing physical environment of the community can be altered by land developments, and how these changes may affect the area’s demographics and economy.

Potential impacts and mitigation for a herd size of 699 milking cows are presented in this section; for a contemplated herd size of up to 2,000 milking cows, impacts and mitigation are presented in Section 4.21.

4.15.1 Existing Conditions - Demographic and Economic Conditions

Demographic Characteristics of Po‘ipū Residents

The project area of Māhā‘ulepū is located in the Po‘ipū area on the south shore of Kaua‘i. In 2010, the population of the Kōloa-Po‘ipū Census tract was 2,544, with a median age of 44.8 years old. This represents nearly 4 percent of the island’s total 67,100 residents.

Between 2009 and 2013, white residents comprised a slightly higher proportion of the Kōloa-Po‘ipū population compared to the County as a whole: 42.1 percent of residents were white compared to 33.4 percent of residents in the County. A slightly lower proportion of the Kōloa-Po‘ipū population was born in the State of Hawai‘i; an estimated 51.6 percent of the region’s population was native born to the State, compared to 55.9 percent for the County as a whole.
The resident profile of the Kōloa-Po’ipū Census tract is slightly older than that of Kaua’i County. The median age in Kōloa-Po’ipū was 44.8 years old between 2009 and 2013, compared to 41.6 years old in the County. The Kōloa-Po’ipū region is characterized by a higher proportion of retirement age residents (65 years and older) and a lower proportion of school age children. Of the residents living in the Kōloa-Po’ipū Census tract, 66.7 percent attended some college or received a higher education degree, compared to 61.1 percent throughout the County (PEP, 2016).

Po’ipū has been known as one of the two major tourist and luxury home destinations on the island, with the largest inventory of hotel rooms, transient vacation rentals, and luxury vacation homes on the island. The north shore is the second major tourist and luxury home region. The median sales price for a single-family home in Kōloa-Po’ipū was $1,210,000 in May, 2015, nearly double the county-wide median price of $645,000 (PEP, 2016).

**Economic Characteristics**

The median household income for Kaua’i County during the period 2009 to 2013 is estimated at $62,052, an increase of 37.8 percent since the year 2000. Approximately 11.2 percent of the County's population was living below the poverty line. Census data for the Kōloa-Po’ipū area shows the median household income level the same as that of the County as a whole ($62,052), though Kōloa-Po’ipū has a higher per capita income and a lower proportion of residents living in poverty (7.5 percent compared to 11.2 percent at poverty for the County).

Tourism is one of the largest industries in Hawai’i. Statewide, the top three industries are educational, health and social services (20.3 percent); arts, entertainment, recreation, and accommodation (15.7 percent); and retail trade (11.6 percent). At the County level on Kaua’i, the employment trends are very similar to the State’s, except with an even greater proportion of the workforce in the tourism-related industries of arts, entertainment, recreation, and accommodation (21.8 percent) as well as retail trade (13.5 percent). Po’ipū area trends mirror trends of the island, further highlighting the strong influence of the visitor industry.

Conversely, the agriculture, forestry, fishing, and hunting industry is one of the smallest in the State at 1.6 percent. On Kaua’i, this percentage is slightly higher at 2.9 percent. The Po’ipū census tract, however, is more similar to the State trend, with agriculture accounting for just 1.5 percent of the employed population.

Despite the changing character of the Po’ipū area towards a resort town, Māhāʻulepū has a long history of agricultural use, as it was one of the first places in the island chain where sugarcane was commercially grown. In 2011, the State of Hawai’i Land Use Commission designated 1,533 acres of land (including 557 acres that make up the Hawai’i Dairy Farms project area) as "Important Agricultural Lands" under HRS Chapter 205 – Hawai’i’s land use law. Per HRS Chapter 205, both State and County governments are responsible for promoting the long-term viability of agricultural use of conserved/protected Important Agricultural Lands. This designation is intended to increase the viability of agriculture through the expansion of the agriculture industry, increase job opportunities, and increase in food security for current and future generations.
Property Values

Economic impacts of nuisance issues that could affect property values were examined. With a long history of agriculture, most of Kaua‘i has a rural ambiance. Most homes and visitor units on the island are within one mile of some agricultural activity; the rural character adds to the appeal of the island. The site of the Grand Hyatt Kaua‘i was rezoned from agriculture to resort; the resort opened in 1992 while sugarcane was still grown just mauka of the hotel property.

Sugarcane fields bordered Kōloa on three sides, and bordered parts of Po‘ipū. Sugarcane fields were burned prior to harvest, creating smoke; dust and soil runoff followed field disturbance; and large canehaul trucks created considerable noise, dust and cane litter. The Kōloa Sugar Mill emitted odors, smoke and noise. The distance of the mill to the nearest homes in Kōloa is approximately 0.8 mile; proposed dairy activities would be 2.5 miles from the nearest home in Kōloa. An agricultural transition to seed crops utilized land adjacent to the Po‘ipū Bay Resort Golf Course. Dust from disturbed, open lands was an issue, and concern of herbicide use drifting offsite dominated community conversations. Dust from proposed HDF operations would be minimal with grass as the cover crop.

With the demise of sugar and seed crops in Kōloa and Po‘ipū, the cattle grazing for the beef market is now the dominant use of agricultural land in the region. Grazing lands to the east, north and west of Kōloa total over 2,900 acres, which is reduced from over 3,300 acres before Māhāulepū Valley was leased by HDF. In the near term, grazing is likely to expand onto most of the lands used recently for seed crops. In Kōloa and Po‘ipū, grazing occurs less than 200 feet from some homes, less than 1 mile from some visitor units, less than one-third of mile to the east and west of the main commercial area of Kōloa, and less than 200 feet from a golf course.

Many of the homes in the region that are near cattle operations are in the northeast and eastern sections of Kōloa; most of the homes were built before 1980 and are of modest size (less than 1,200 square feet). For these homes, the 2016 median assessed values ranged from $406,100 to $567,500. At the western end of Po‘ipū is Kukui‘ula—a luxury residential community that abuts grazing land. Most of the homes are newer, built after 2012, and most are large at over 2,100 square feet. For 2016, median assessed values of these residential lots and homes ranged from $1,297,150 for a lot, to $2,893,100 for a lot with home.

4.15.2 Probable Impacts and Mitigation Measures - Demographic and Economic Conditions

Impacts that would be considered significant related to demographic and economic conditions could include:

- Impact of construction labor and materials on local economy and businesses; and
- Long-term impacts from the dairy operation on nearby property values and the agricultural industry locally and Statewide.
Short-term Impacts and Mitigation – Demographic and Economic Conditions

The Hawai‘i Dairy Farms project would create short-term benefits through jobs for local construction personnel and local material suppliers. Construction employment would be expected to average about 12 jobs per year during the development period. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Thus direct-plus-indirect employment associated with Dairy development would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i (PEP, 2016).

Construction of the facilities at HDF would contribute approximately $9.1 million per year during the development phase. This includes direct equipment and construction expenditures, and indirect sales related to construction.

In addition to the creation of an average of 12 construction worker jobs during the estimated construction period, the State of Hawai‘i and County of Kaua‘i will receive excise tax revenues on finished development and building materials, conveyance taxes, and income taxes on wages. Revenues from development activities to the State is estimated at $650,000, with revenue offset by a tax credit for improvements on lands designated IAL. County revenue derived from development will be negligible.

Long-term Impacts and Mitigation – Demographic and Economic Conditions

Hawai‘i Dairy Farms would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Big Island), less than 10 percent of Hawai‘i’s milk is locally supplied. The Hawai‘i Dairy Farms project, with an established herd of up to 699 milking cows, will increase the supply of local fluid milk by approximately 1.5 million gallons of milk annually, a 50 percent increase in statewide milk production. Once the facility is established and dairy operations have reached the committed herd size, approximately 11 direct and indirect full-time equivalent jobs would be sustained on Kaua‘i, including 5 farm jobs and about 6 indirect jobs. An additional 3 indirect jobs would be created on O‘ahu. For the contemplated herd size direct and indirect employment will roughly double.

Once fully operational with a herd of 699 mature dairy cows, annual direct-plus-indirect sales are estimated annually at $8.1 million on Kaua‘i, with an additional $2 million on O‘ahu.

When the dairy has matured to full production for the 699-cow dairy, net income to the State is calculated to exceed $60,000 annually. Net income to the County from HDF is anticipated to generate $51,000 (PEP, 2016)

Employment and sales and tax revenue for the contemplated herd size of up to 2,000 milking cows is discussed in Section 4.21.
Results of technical study on economic impacts included an evaluation of property values adjacent to grazed areas within Kōloa and Poʻipū. New, larger homes being built adjacent to grazing lands in developments with amenities, the 2016 median assessed values ranges from $1,297,150 for a lot, to $2,893,100 for a lot with home. Clearly, beef cattle operations are compatible with nearby homes, commercial areas, resorts and recreational areas. Although stocking densities are lower for beef cattle on unirrigated pastures than they are for the proposed dairy on irrigated pastures, the operations are similar: cattle are rotated among pastures as limited by the carrying capacity of the land.

Results of technical studies and the findings of the EIS show no unmitigated nuisances that would affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will reach resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area. The dairy will help maintain the existing rural character and ambience of the Kōloa-Poʻipū region. (PEP, 2016).

4.16 GROUNDWATER RESOURCES

Water is essential for life. As an island state, Hawai‘i has limited access to natural fresh water supplies. Competition for fresh water from increasing resident and visitor populations, as well as potential impacts of global climate change, require that Hawai‘i become as efficient as possible in its use of limited fresh water supplies. More than 90 percent of the State’s drinking water comes from groundwater sources, while much of the water used for agricultural irrigation comes from surface water sources (CH2MHill, 2013).

Groundwater is defined by the State Water Code as “water found beneath the surface of the earth, whether in perched supply, dike-confined, flowing, or percolating in underground channels or streams, under artesian pressure or not, or otherwise.” Groundwater is protected through regulation at the Federal, State and County level. The Commission on Water Resource Management (CWRM), under the State Department of Land and Natural Resources, is the primary steward of the water resources public trust and has broad powers and responsibilities to protect and manage Hawai‘i’s water resources.

CWRM administers the State Water Code, codified in Hawai‘i Revised Statutes Chapter 174C (2008 amendment) and associated administrative rules. Other State agencies continue to have responsibilities for water quality (Department of Health) and coastal zone management (Department of Business, Economic Development and Tourism). Four types of water resource and development plans are referred to as the “Hawai‘i Water Plan”: a water resource protection plan prepared by CWRM; water use and development plans prepared by and for each county; a State water project plan; and a water quality plan prepared by the Department of Health.

This section of the EIS presents existing conditions of groundwater resources of the Māhā‘ulepū area, and assesses probable impacts from dairy farm operations with the committed herd size of 699 milking cows. Probable impacts and recommended mitigation for groundwater related to the contemplated herd size of up to 2,000 milking cows are presented in Section 4.22.
4.16.1 Hydrology

Existing Conditions - Hydrology

The Kōloa area was formed by lavas of the Napali formation of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series (COK DOW, 2001).

Groundwater units have been established by CWRM (2008) to manage groundwater resources. Primarily determined by subsurface conditions, each island is divided into regions that reflect hydrogeological similarities within hydrographic, topographic and historical boundaries. The hydrologic unit encompassing Māhā‘ulepū Valley is the 51-square mile Kōloa Aquifer System Area (code 20101). The sustainable yield of the aquifer is 30 million gallons per day (MGD). For the Kōloa aquifer in general, CWRM (2008) notes that the nature and extent of the basal ground water lens is not well understood due to the presence of a discontinuous, unmapped confining layer.

An analysis of groundwater and surface water was conducted for this EIS that identified two groundwater bodies within the valley: (1) a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor; and (2) shallow groundwater in the thick alluvium. The alluvial material is highly weathered lava composed of dark brown to black silty clay and clayey silt. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Groundwater wells developed for access to potable water are described in the following section 4.16.2, Potable Water.

Four wells to access groundwater in the alluvium were installed within the HDF site to facilitate the groundwater and surface water analysis. Water quality samples were taken to determine general conditions and to document baseline conditions, and the alluvial waterbody was monitored in response to pumping within the deep aquifer wells located in the volcanics to determine hydrologic connectivity. The proposed water quality monitoring program is presented in Section 4.16.3, Probable Impacts and Recommended Mitigation.

Hydrologic Connectivity of Waterbodies within Māhā‘ulepū

The groundwater and surface water analysis for this EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth. Additionally, the study quantified the current water quality within the alluvial waterbodies. Methods and results of the examination are summarized here and the full report is included in Appendix E.

The following studies were conducted to determine any relationship between groundwater bodies, as part of the groundwater analysis:

1. Review of drilling logs for the last four wells developed in the Well 14 Battery, which ascertained the wells fully penetrated the alluvium and tap into groundwater within the unweathered volcanics;
2. Measurements of salinity and temperature of groundwater from two water bodies – one in the unweathered volcanics, and another in the deep alluvium on the valley floor;
3. Pump testing of a well in the Māhā'ulepū Well 14 Battery while monitoring response of groundwater in the alluvium; and
4. Response of groundwater in the alluvium to operation of the Kōloa Well F pump.

Driller’s logs for installation of the final four wells developed in the Māhā'ulepū Well 14 Battery were published in the 1960 Bulletin 13 of the Hawai‘i Division of Hydrography. The logs record sticky red, brown, and purple clay layers from 75- to 300-foot depth. These layers are essentially impermeable and function as an aquiclude to separate the groundwater in the alluvium from the confined groundwater in the underlying volcanics (TNWRE, 2016).

Measurements of salinity and temperature in the deep, confined aquifer accessed through one of the three Māhā'ulepū 14 wells showed a uniform conductivity and temperature, at 335 μS/cm and 72.0° F, respectively. Measurements of the groundwater within the alluvium show significantly higher salinity in three of the monitoring wells (HDF-1, HDF-3 and HDF-4), and significantly lower salinity (fresher) water in HDF-2. Water in the four monitoring wells was 2 to 6 degrees warmer than the temperatures recorded in the deep aquifer. Percolation of rainfall directly on the ground and surface runoff from upland provides recharge to the groundwater in the alluvium; the significant salinity and temperature differences measured between the aquifers suggests discharge of water from the alluvium into the deep volcanic aquifer is not occurring (TNWRE, 2016).

The pump test utilized water level recorders within wells HDF-1 and HDF-2, as well as two wells in the Well 14 Battery, to measure drawdown of water within a well while pumping water out of the Māhā'ulepū 14 well. The test was conducted on March 17, 2015; water levels were recorded at 30-second intervals throughout the 10-hour pumping period. By the end of the pumping period, water levels were drawn down 17.1 feet (at a pumping rate of 825 gallons per minute [gpm]) in the Māhā'ulepū 14 well. Water response in the other two wells within the Well 14 battery was instantaneous; one located 96 feet east showed drawdown of 5.3 feet, and the other located 67 feet west of the Māhā'ulepū 14 well showed drawdown of 3.7 feet.

Response of water levels within the two monitoring wells was also recorded. HDF-1 is 190 feet east of the pumped well. The water level actually showed a build-up of 0.05 feet during the pump test. This was attributed to the weight of the pumped water deposited on the ground surface. Otherwise, there was no response to the well water level. HDF-2 is 1,300 feet east of the pumped well, and showed no response to pumping. Graphs of the results can be found in Appendix E.

Finally, water level recorders were installed in each of the four HDF monitor wells and in the County Department of Water (DOW) Kōloa Well F for a seven-day period from May 13 to 20, 2015. The objective was to determine any identifiable response in the nearest monitoring well, HDF-4, which is 630 feet from Kōloa Well F. The most likely response was anticipated to be a pressure pulse arriving at HDF-4 several minutes following the starting or stopping of the pump at Kōloa F well. No such response occurred.

The groundwater and surface water study provides insight to the depth of the groundwater in the alluvial layer. Toward the inland end of the property (wells HDF-1 and 2), groundwater levels are about 80 feet AMSL. The level drops rapidly going makai, to 68 feet AMSL at HDF-4, and to 49 feet at HDF-3. In general, the movement of groundwater in the alluvium is from mauka to makai with ultimate discharge into the marine environment. Seasonally, modest amounts of groundwater may
discharge to the agricultural ditch during wet conditions in the vicinity of the HDF-1 and HDF-2 monitoring wells. Because the groundwater level drops substantially at the makai end of the site (near the HDF-3 monitoring well), no groundwater discharge to the ditches occurs in this area (TNWRE, 2016).

Overall, groundwater levels in the alluvial layer are 30-feet to more than 50-feet higher than the piezometric head of groundwater in the confined underlying volcanic series. The results of the four examinations demonstrate that there is complete hydrologic separation of the two groundwater bodies in Māhāʻulepū (TNWRE, 2016).

4.16.2 Potable Water

Existing Conditions – Potable Water

Wells in Māhāʻulepū Vicinity

HDF will utilize an onsite well for potable water that was established a century ago to serve the sugarcane plantation. The last of the 14 field wells developed between 1897 and 1928, it is the deepest of the wells drilled through alluvial material to reach the aquifer deep within the volcanic series (Table 4.16-1 Information on Wells In and Near to Māhāʻulepū, Kauaʻi). The battery of wells produced 3 MGD during use for sugarcane irrigation (TNWRE, 2016).

<table>
<thead>
<tr>
<th>Table 4.16-1</th>
<th>Information on Wells In and Near to Māhāʻulepū, Kauaʻi</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State</strong></td>
<td><strong>Well Name</strong></td>
</tr>
<tr>
<td><strong>Number</strong></td>
<td><strong>Diam.</strong></td>
</tr>
<tr>
<td>5425-01</td>
<td>Well 1</td>
</tr>
<tr>
<td>5425-02</td>
<td>Well 2</td>
</tr>
<tr>
<td>5425-03</td>
<td>Well 3</td>
</tr>
<tr>
<td>5425-04</td>
<td>Well 4</td>
</tr>
<tr>
<td>5425-05</td>
<td>Well 5</td>
</tr>
<tr>
<td>5425-06</td>
<td>Well 6</td>
</tr>
<tr>
<td>5425-07</td>
<td>Well 7</td>
</tr>
<tr>
<td>5425-08</td>
<td>Well 8</td>
</tr>
<tr>
<td>5425-09</td>
<td>Well 9</td>
</tr>
<tr>
<td>5425-10</td>
<td>Well 10</td>
</tr>
<tr>
<td>5425-11</td>
<td>Well 11</td>
</tr>
<tr>
<td>5425-12</td>
<td>Well 12A</td>
</tr>
<tr>
<td>5425-13</td>
<td>Well 13</td>
</tr>
<tr>
<td>5425-14</td>
<td>Well 14</td>
</tr>
<tr>
<td>5425-15</td>
<td>Koloa F</td>
</tr>
<tr>
<td>5426-04</td>
<td>Koloa C</td>
</tr>
<tr>
<td>5426-05</td>
<td>Koloa D</td>
</tr>
</tbody>
</table>
Figure 4.16-1  Wells in Māhā‘ulepū Vicinity
In 1928, the original 10 wells were abandoned when the well battery was modified with four new wells and above-ground line shaft turbine pumps. Of the four well drilled in 1927 to 1928, only three functional wells were relocated during the groundwater and surface water analysis conducted for this EIS. One well will provide potable water to be used by HDF for dairy operations, a second well will be maintained as a back-up for potable water, and the third well will be utilized for deep groundwater monitoring.

The County of Kaua‘i developed three potable water wells in 1977, 1981, and 1998 to meet the demand for the growing Poʻipū resort community (Figure 4.16-1, Wells in the Māhāʻulepū Area). Well depths range from 198-feet to 247-feet below sea level and lie in the water-bearing, unweathered Waimea volcanic series. The Kōloa F well, developed in 1998, is the closest public water source to the proposed dairy with a distance of 580-feet from the closest boundary of the HDF leased area, and approximately 0.6 mile from the dairy facilities (Figure 3.3-4). Geotechnical investigations at the Kōloa F well site determined that residual and alluvial soils underlie the surface to a depth of at least 15 feet, much shallower than the estimated 60-foot depth of alluvium on the valley floor of deep (COK DOW, 2001).

A report prepared in June 1999 on development of Kōloa F well noted barometric responses in the County Kōloa wells indicated confined aquifers or compartments (COK DOW, 2001).

Groundwater Source Protection

To assess the susceptibility of public water systems to contamination, the State of Hawai‘i Department of Health Clean Water Branch (CWB) initiated a source water assessment program (SWAP) consistent with Federal requirements established by the U.S. Environmental Protection Agency (EPA) and with existing assessment and protection efforts in Hawai‘i (Whittier et al., 2010). The SWAP process involved: (1) delineation of the area around a drinking water source through which contaminants may travel to the water supply; (2) inventory for potential activities that may release microbiological or chemical contaminants within the delineated area; and (3) determination of the drinking water source susceptibility to surrounding potential contamination activities (Spengler, 2014).

The SWAP delineated three zones of contribution referred to as capture zone delineations (CZD) for all public drinking water sources in the State of Hawai‘i based on groundwater time-of-travel (TOT) criteria (Whittier and El-Kadi, 2014). The initial zone, Zone A, is the “well control site” zone and consists of a 50-meter diameter around each well. The second CZD, Zone B, delineates the 2-year TOT, which relates to conservative survival times for bacteria and viruses in soil and groundwater. The third CZD, Zone C, delineates the 10-year TOT, which would allow sufficient time to implement management and remedial measures to mitigate contamination from accidental contamination spills or other causes (Whittier, 2010).

Figure 4.16-2 depicts the modeled capture zones for the Kōloa F well, and displays the groundwater flow pathlines from the west- north-west. The modeling depicts Zone C, the 10-year TOT, overlapping the southwest corner of the HDF site indicating a potential for leachate. However, results of the hydrologic assessment demonstrate the complete hydrologic separation of the two groundwater bodies in Māhāʻulepū: the aquifer in the deep unweathered volcanic series and the source of the Kōloa F well, from the groundwater in alluvial layers on the valley floor. Additionally, the groundwater flow pathlines depict the majority of water captured is from the west- north-west (CWB, 2016).
A discussion of the ability of soils to mediate bacteriological and chemical contaminants is introduced in Section 4.3.1, Soils. As shown in Figure 4.3-2, the hydraulic conductivity of the soils in Māhā'ulepū range from 10.5 – 50 feet per day. The hydrologic assessment conducted for this EIS estimates the permeability coefficient as almost certainly less than 1.0 feet per day (TNWRE, 2016).

Findings for the Po'ipū - Kōloa region are included in the following section.

Figure 4.16-2  County Well Head Capture Zone Delineation

*Department of Health Clean Water Branch Sanitary Survey*

Public complaints of contamination of Waiopili Ditch spurred an investigation by the Hawai'i Department of Health CWB into all possible sources that may contribute to high bacteria levels or other potential contamination sources in a watershed. The CWB research utilized a methodology known as a “Sanitary Survey.”

The Sanitary Survey completed by the CWB (2016) documents the existing inventory of wastewater injection wells, stormwater injection wells, and individual wastewater systems including cesspools in the highly urbanized Waikomo Watershed. The Waikomo Watershed includes the developed areas of Kōloa and Po'ipū. Approximately 120 injection wells discharge an estimated 1.4 MGD per day. Cesspools discharge raw sewage into the ground without treatment at the estimated rate of 1.6 MGD per day and represent 76 percent of the 2,238 on-site disposal systems (OSDS) in the area. There are no wastewater injection wells within the Māhā'ulepū sub-watershed or upgradient of the dairy property.
The Kōloa karst topography and lava tube systems that straddles the Waikomo Watershed may provide transport of injection well and cesspool effluent to the Makauwahi Cave/sinkhole lava tube system in the Māhāʻulepū sub-watershed. The fate of these discharges is eventual release into the nearshore waters at various points at reef shelf depths offshore. The Sanitary Survey estimates groundwater and coastal waters of south-east Kaua'i are being contaminated with roughly 3 MGD of wastewater daily (CWB, 2016).

**Groundwater Monitoring Wells**

As described earlier in this section, four wells to access groundwater in the alluvium were installed within the HDF site to facilitate the hydrologic assessment. Analysis of water quality samples were conducted to serve as a baseline for the nutrient composition of the shallow waterbody within the alluvium. Future water quality samples can then be compared to these samples, collected prior to dairy implementation. Periodic assessments can identify any change in nutrient content that may identify seepage of nutrients into this waterbody. While the waterbody in the alluvial material is hydrologically disconnected from the deeper aquifer in volcanic basalt, any significant increases could inform nutrient management of HDF and allow for management changes to minimize nutrients not being effectively utilized by the grass crop.

Results from the baseline water quality samples collected in May and July of 2015, show that water within the alluvial ground waterbody is fresh (salinities on the order of 0.18 to 0.47 parts per thousand). Results also reveal that the nitrogen and silica levels are much lower than typical for groundwater in Hawaiian basalt. Typical nitrogen levels in basalt aquifer wells throughout the State are 70 to 80 μM, per the hydrologist’s experience over decades of sampling. Typical silica levels are 700 μM. For the groundwater in the alluvium sampled from the monitor wells, nitrogen and silica are about half the typical levels found in wells tapping aquifers in basalt. The complete results of the groundwater monitoring are contained in both Appendix E (Estimates of the Potential Impact on Groundwater and Surface Water by Hawaii Dairy Farms in Mahaulepu, Kauai) and Appendix F (Baseline Conditions and An Assessment of the Effect of the Proposed Hawaii Dairy Farm on Surface Water and Marine Water Chemistry, Mahaulepu, Kauai, Hawaii).

One of the three usable wells in the Māhāʻulepū 14 battery will be utilized as needed for deep water quality monitoring.

### 4.16.3 Probable Impacts and Mitigation Measures - Groundwater Resources

Impacts that would be considered significant related to groundwater supply and groundwater quality could include:

- Depleting the groundwater supply or interfering with groundwater recharge for aquifers in the project area; and
- Degradation of groundwater quality below State or Federal standards.

**Short-term Impacts and Mitigation – Groundwater Resources**

Water supply required for construction is anticipated to be nominal in comparison to previous agricultural water demand. The major water demand during construction will be for fugitive dust control in compliance with Hawai‘i Air Quality rules (see Section 4.19). Water will come from a non-municipal source: either the on-site deep wells; or from the HDF allocation of water from Waita Reservoir (see following Section 4.17, Surface Water).
Construction of Hawai‘i Dairy Farms facilities is not anticipated to deplete the groundwater source or interfere with groundwater recharge in the short-term. There will be no significant effect on the groundwater supply in the short-term.

**Long-term Impacts and Mitigation – Groundwater Resources**

Long-term groundwater supply impacts are not anticipated to be significant. Total potable water demand is approximately 30,000 gpd (0.03 MGD) for the committed proposed action herd size of up to 699 milking cows (Table 4.16-2). Groundwater use for the contemplated herd size of up to 2,000 milking cows is shown in Section 4.22, Table 4.22-1. The demand of approximately 30,000 gallons per day (0.03 MGD) the committed herd size is a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era (TNWRE, 2016).

<table>
<thead>
<tr>
<th>Water Demand for HDF Operations Committed Herd Size of 699 Milking Cows</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Potable Water</strong></td>
</tr>
<tr>
<td>Wash water, milk cooling, employee use †</td>
</tr>
<tr>
<td>Livestock water (*25 gpd/cow)</td>
</tr>
<tr>
<td><strong>Total Potable Demand</strong></td>
</tr>
</tbody>
</table>

*The majority of water used will be captured and re-used to irrigate pasture grass.*

A majority of the potable water will be used as wash water. Chapter 3, Section 3.3.1.7 notes that the DOH Milk Rules require potable water for milk production including that used as wash water in the milk house and milking operations. The pasture-based dairy system utilizes all manure produced on site, capturing effluent washed from the milking parlor and holding yards though floor drains via pipes into the effluent ponds. The water and associated nutrients from cow effluent are then reused on pastures as irrigation water. All potable water used as wash water will be re-applied to pasture and thus remain a part of the hydrologic cycle.

The buildings with related infrastructure and paved area of the dairy facility will constitute less than two percent of the total site acreage. Therefore, minimal impermeable area will be created. Stormwater runoff will either be directed to areas of grass, or be routed via curbing to the effluent ponds for runoff that potentially contains manure.

The groundwater and surface water analysis determined that the modest potable water use rate for dairy operations, and the 4,500-foot distance between the Māhāʻulepū 14 well and the nearest County potable water well (Kōloa Well F), will result in no adverse impacts to ongoing use of groundwater in the unweathered volcanic series, which is the source of potable water (TNWRE, 2016). Further, the assessment determined there is no hydrologic connection between the aquifer in the unweathered volcanic series, the source of potable water, and the shallow groundwater body in the alluvium. Thus nutrients added by the dairy operation will have no impacts to the County drinking water well, the source of potable water within the deep volcanics.

A calculation of applied nutrients that may pass-through grass and soils was estimated based on the mass nutrient balance for HDF (TNWRE, 2016). The estimate assumed that of the nutrients applied or excreted at the HDF site, two percent of total nitrogen and one percent of phosphorus could...
potentially pass through the turf and soil: to shallow groundwater and eventual release to surface water. Surface water is estimated to carry three times more nutrients than groundwater moving through the alluvium on the valley floor (see following discussion, Surface Water). The nutrient contributions from the dairy pastures would not occur as chronic daily releases, rather, the runoff contributions would be limited to periods of major rainfall and storm water events. Per best practices, no effluent application would be conducted during such weather events.

Though the waterbody in which the County wells occur (the deep volcanics) is confined and hydrologically separated from shallow waterbodies in the Māhāʻulepū Valley alluvial material, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Chapter 3, Figure 3.5-2, Paddock Layout, shows the area within the HDF site that will be excluded from grazing and nutrient application. This is greater than the 50-meter well control zone, and is significantly greater than the 50-foot setback for application of livestock effluent identified in the Livestock Waste Management Guidelines (UH, 2010).

Four water monitoring wells installed by HDF into the shallow water aquifer within the alluvium will allow long-term water quality monitoring. Monitoring and analysis of nutrient and chemical constituent levels over time will identify any change in composition of shallow groundwater in the alluvium. Results from the monitoring program will be shared with DOH, dairy neighbors and the local Kauaʻi community.

4.17 SURFACE WATER RESOURCES & NEARSHORE MARINE ENVIRONMENT

The State DLNR Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge.

This section of the EIS presents existing conditions of surface water resources and the nearshore marine environment of the Māhāʻulepū area, and assesses probable impacts from dairy farm operations with the committed herd size of 699 milking cows. Probable impacts and recommended mitigation for surface water resources and nearshore marine related to the contemplated herd size of up to 2,000 milking cows are presented in Section 4.23.

4.17.1 Intermittent Streams and Agricultural Ditches of Māhāʻulepū Valley

Existing Conditions – Surface Waters and Ditches

The project area is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the project site across the valley floor; and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waipōli Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south. Older agricultural ʻauwai (ditch) that run in and around the project area appear abandoned and no longer functional.
The main surface water course which crosses the HDF site is not named on the U.S. Geologic Survey quadrangle map. At its mauka end above the HDF property, it is a relatively steep, naturally occurring water course with several small tributaries. Across the HDF property and for some distance further makai, the channel is manmade and was created to facilitate former sugarcane irrigation. The groundwater and surface water analysis conducted for this EIS (see Section 4.16.1, Hydrology) observed that groundwater from the alluvium discharges into the channels on a seasonal basis in the vicinity of the HDF-1 and HDF-2 monitoring wells. In the lower elevations of the site no such discharge occurs as the groundwater level in the alluvium is substantially lower.

There are a number of other drainage channels that convey surface water runoff which originates offsite and cross or border the HDF property. Historically the Waita Reservoir Ditch circumnavigated the Māhā'ulepū Valley floor, bringing water to both the Māhā'ulepū Reservoir (outside the HDF site) and to provide for sugarcane furrow irrigation. This ditch apparently fell out of use when the irrigation method was converted from furrow to drip (TNWRE, 2016). From that time forward, water from the Well 14 battery was apparently the sole source of irrigation for sugarcane in the valley. In the post-plantation period (from about 1999), water from Waita Reservoir has been delivered to Māhā'ulepū via a 12-inch pipeline. The pipeline supplies an actively cultivated taro farm within Māhā'ulepū Valley, banana cultivation near DOW's Kōloa Well F, a quarry on the east side of the valley, and agricultural crops makai of the HDF property. HDF is utilizing the non-potable water source to irrigate approximately 70 acres of grass at the mauka end of the site.

Many of the aquatic features just described are shown on the USFWS National Wetlands Inventory (NWI) and assigned codes that describe the habitat type presumed by the Inventory (most information in the NWI was derived from aerial photographs and maps, not field investigations; USFWS, 2014). All of the water ditches on the property (and the ‘auwai around the margin of the valley floor) are coded “R4SBCx”, which represents: intermittent (seasonally flooded) flowing water, in an excavated channel. An exception is the ditch (and channel upslope) directing stream flow off Kāmaulele (Figure 4.4-2), which is coded R3RBH: an upper perennial stream with a rock bottom. However, this characterization is unlikely (Rana Biological and AECOS, 2016). According to CWRM (2005, 2008), there are no perennial streams in the Māhā'ulepū watershed.

4.17.2 Surface Water Quality

Hawai‘i’s Department of Health Clean Water Branch (CWB) administers and enforces Statewide water pollution laws and rules. CWB oversees permits for point-source discharge, monitors permit compliance, investigates complaints, and conducts water quality sampling. The CWB Monitoring and Analysis Section is responsible for sampling and analysis in support of Federal Clean Water Act (CWA) §303(d) assessments, §305(b) integrated reports, and §319 non-point source management grants. A major activity of CWB is water quality monitoring of beaches as initiated under the Beaches Environmental Assessment and Coastal Health Act of 2000 (BEACH), an amendment to the Federal CWA. Additionally, coastal chemistry monitoring of nearshore and offshore waters is conducted for select indicators of water quality; however, offshore sampling has been suspended due to manpower and funding constraints (CWB, 2012).
Water quality standards are established relative to designation of the waterbody (e.g. inland freshwater, open ocean, embayment, estuaries). Classification of State waters (inland or marine) and water uses are documented in Hawai‘i Administrative Rules (HAR) HAR §11-54. Narrative and numeric criteria are specific to waterbody classification, and provide the basis for evaluating water quality data. The U.S. Environmental Protection Agency (EPA) recommended new water quality criteria for recreational waters to protect health of beaches and waters. Priority for Hawai‘i’s nearshore water quality monitoring goes to public beaches where the general public recreates in numbers; areas accessed across private lands are typically not included due to limited funding.

The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. Its “Blue Water Task Force” typically collects water samples from the ocean environment, and some streams not tested by DOH. The group reported high levels of enterococcus to the State DOH and provided its data. However, for DOH to utilize water quality data provided by a third party, the party must furnish its Quality Assurance Project Plan, chain of custody, and laboratory reports. Evaluation of the third-party data by DOH CWB determined it did not meet CWB quality assurance/quality control requirements, and it could not be used for regulatory purposes.

CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā’ulepū Surface Water Hydrologic Unit as the remote areas are on private lands. Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā’ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I (CWB, 2016).

The findings of the Sanitary Survey indicate that high levels of enterococcus and Clostridium perfringens occur in sediment of Waiopili Ditch. Soil has been identified as a primary source of fecal indicator bacteria in the environment, and can be transported by precipitation into even pristine streams and rivers (Hardina and Fujioka, 1991, in CWB, unpublished). The agricultural ditch and intermittent streams showed degraded water quality parameters for nutrients and pathogens. Elevated levels in these water courses is due to the low flow conditions and varied inputs from the agricultural lands and natural contributions from the watershed. Water inputs to the agricultural ditches come from a watershed area surrounding the Māhā’ulepū Valley, including the sloped areas from Ha’upu Ridge (CWB, 2016).

The Sanitary Survey found no significant impact to the Waiopili Ditch from any activity that can be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā’ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays that could help reduce bacteria levels. CWB notes that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The predicted risk of illness from recreation exposure to a cattle-impacted waterbody is 25- to 150-times lower than the risk of illness associated with human sources of contamination (EPA, 2010 in CWB, 2016).
Marine Research Consultants, Inc. (MRCI) conducted water quality surveys of the intermittent streams and agricultural ditches feeding into and including the Waiopili Ditch for this EIS (see Figure 4.17-1). Counts of indicator bacteria (enterococcus and *C. perfringens*) in surface water samples and nearshore marine samples showed no repetitive pattern: counts were high and variable between sampling sites, and showed variation among periods sampled. As no dairy activities existed during the sampling, the high levels of indicator bacteria appear to be the result of naturally occurring sources, as well as other ongoing land uses (MRCI, 2016). These sources may include feral animals, or domesticated animals (pigs, sheep) that are being raised near the dairy property. No dairy cattle were present on the site during any of the sampling events, so the observed counts of indicator bacteria are not a result of dairy operations.

### 4.17.3 Nearshore Marine Waters

Water quality constituents including nutrients and bacteria were measured in the nearshore waters off Waiopili Ditch and the coastline along Māhāʻulepū and Poʻipū to establish baseline conditions for this EIS (see Figure 4.17-1). Ocean waters along this shoreline are considered high quality ocean waters due to the active wave, winds and currents which provides mixing energy. This stretch of open coastal waters is classified as class A under State Water Quality Standards, as no embayments, marine waters, or open coastal waters in the vicinity are listed in HAR §11-54 for special protection. Use of class A waters in the standards state: “the objective of class A [marine] waters that their use for recreational purposes and aesthetic enjoyment be protected. Any other use shall be permitted as long as it is compatible with the protection and propagation of fish, shellfish, and wildlife, and with the recreation in and on these waters. These waters shall not act as receiving waters for any discharge which has not received the best degree of treatment or control compatible with the criteria established for this class” (DOH, 2014).

Comparing the surface water samples to those taken in nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline (MRCI, 2016).

Analyses of water chemistry samples from the marine environment indicate two major patterns. Small elevations of inorganic nutrients (Si, NO₃-, PO₄³-, TN, TP) at the shoreline, along with corresponding decreases in salinity indicate only a small input of groundwater at the shoreline. Groundwater input is mixed to background oceanic values within meters of the shoreline. Along the marine sampling station originating at the juncture of Waiopili Ditch and the ocean, steep gradients of nutrients, salinity, Chloryphyll *a* and turbidity were observed. These gradients are the result of a narrow zone of mixing between ditch water and ocean water in the intertidal region of the reef flat. Typical oceanographic conditions of tradewind generated seas and long-period swells breaking on the reef platform result in rapid mixing and dilution of ditch water constituents within a narrow zone that only extends several meters from the shoreline. As a result, input from ditch water is highly restricted in terms of effects to the marine environment.

The MRCI report is included as Appendix F.
Figure 4.17-1  Surface and Marine Water Sampling Sites
4.17.4 Probable Impacts and Mitigation Measures

Impacts that would be considered significant related to surface water could include:

- Cows depositing manure into on-site surface water and damaging the banks of the drainageway causing erosion;
- Introducing sedimentation into the on-site drainage ways; and
- Stormwater run-off carrying manure or nutrients into surface waters.

The probable impacts to surface waters and the nearshore marine environment are discussed in this section. The *Surface Water Quality and Marine Assessment* report prepared by MRCI includes an analysis of potential impacts from dairy operations, including nutrient run-off from the dairy site. Proposed minimization and mitigation measures to reduce HDF impacts to surface waters and the nearshore marine environment are included.

**Short-term Impacts and Mitigation Measures – Surface Water Resources & Marine Environment**

As discussed in Chapter 3.0, Description of the Proposed Action and Section 4.2, Topography, there will be site work required for pasture establishment and dairy facilities development. These developments will be designed to employ NRCS standards per the HDF Conservation Plan. Best management practices will be utilized during construction and pasture establishment.

A Stormwater Pollution Prevention Plan (SWPPP) has been developed for the site to document controls and best management practices to avoid, control, and trap potential erosion associated with construction activities. The SWPPP is required as part of the application for the NPDES – Construction Stormwater General Permit, and describes any discharge in compliance with relevant regulations.

In compliance with Federal and State Clean Water regulations, HDF will institute appropriate controls and procedures to retain stormwater impacted by construction, and to prevent hazardous materials such as petroleum products from construction vehicles from coming into contact with stormwater run-off. Both management controls and structural controls will be implemented in the short-term. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; prohibiting leaking or poorly-maintained construction equipment and machinery; and keeping adjacent public, paved streets free of dirt and mud. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads with application of best management practices.

Short-term adverse impacts to surface waters from construction are anticipated to be within NPDES permitted levels. No short-term adverse effects are anticipated to the quality of nearshore ocean waters and the nearshore marine environment.
Long-term Impacts and Mitigation Measures – Surface Water Resources & Marine Environment

Long-term impacts will improve surface water quality in agricultural ditches and the downstream Waiopili Ditch.

Soil Erosion and Suspended Sediments. Over the long-term, the surface water quality in the agricultural ditches and Waiopili Ditch will be improved by active management of the dairy site. Cultivation of a grass thatch for complete vegetative cover throughout the dairy paddocks will minimize currently exposed soils within the site.

Vegetation and stream flow in the areas downstream of the dairy site are beyond the control of the dairy operation. Mahaulepu Farm’s agricultural tenants have responsibilities to maintain farm lands and vegetation growth along ditches to allow channel flow during peak stormwater runoff events. Suspended soil inputs from natural sources and offsite ranching and agricultural uses in the watershed will continue to enter the agricultural ditches, which drain downstream into Waiopili Ditch and the nearshore ocean waters.

Waiopili Ditch receives runoff from the larger 2,700-acre Māhā’ulepū Valley sub-watershed, including the lands mauka and makai of the dairy facilities and pasture paddocks. The dairy site represents roughly 20 percent of the sub-watershed, and soil erosion within the dairy will be reduced by establishment of the thick grass ground cover for pasture and filter strips along drainageways (Section 4.3.2, Soils).

Nutrients from Effluent Irrigation and Commercial Fertilizer Application. The Conservation Plan and best management practices include setbacks to minimize impacts to waterways. For effluent application, the setback is 50 feet from drainageways. Irrigation and nutrients application will maintain sufficient pasture grazing grasses for the herd. Non-potable irrigation water from Waita Reservoir will be applied through the central pivot system, and can be mixed with nutrient-enriched water from the effluent ponds as fertilizer. Refer to Section 3.5.3 and Appendix D, Nutrient Balance Analysis (Group 70 and Red Barn, 2016).

The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 milking cows. Therefore, supplemental commercial fertilizer will be required to provide sufficient nutrients to sustain the pasture grass at the committed herd size. In keeping with the NRCS Nutrient Management Practice Code, monitoring and analysis of soil, manure, and tissue samples will be used to amend the nutrient budget analysis prepared for the site (Appendix D).

Surface water is estimated to carry three times more nutrients than groundwater moving through the alluvium on the valley floor (see previous discussion, Groundwater). The groundwater and surface water analysis (Appendix E) estimates two percent of total nitrogen and one percent of phosphorus could potentially pass through the turf and soil. Given the poor permeability of the alluvium, groundwater flow would be modest. However, the groundwater level in the alluvium is approximately 80 feet above mean sea level near the HDF monitoring wells 1 and 2. The groundwater can rise in wetter periods and intersect the deep drainage ditches. Episodic, seasonal events will result in a modest amount of discharge from groundwater into the surface channel.

Using NRCS curve number method to compute runoff for the sites’ B and D class soils and irrigated pasture in good condition, it is estimated that actual runoff into drainageways from HDF pasture will only occur when rainfall exceeds 0.8 inches. Based on the 30-year daily rainfall record for the
area, such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually (TNWRE, 2016). Applying the estimates of nutrient pass-through to the HDF operational nutrient mass balance, two percent of nitrogen pass through would total 10,000 pounds per year, and one percent of phosphorus pass through would total 900 pounds per year. Note that nutrient release from the dairy site would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall and storm water events. Per best practices, no effluent application would be conducted during such weather events.

Section 4.20.1, Interrelationships and Cumulative Environmental Impacts, compares the nutrient input from the adjacent Kōloa- Poʻipū region. Nitrogen additions to the near-term marine environment along the Poʻipū coastline are estimated at 38,510 pounds per year from domestic wastewater and landscape fertilization, equating to 3.5 times greater than the potential contribution from HDF; phosphorus of 1,260 pounds per year is calculated and is 1.4 times greater than the potential contribution from HDF.

**Nutrients from Manure in Pastures.** Utilizing nutrients from the manure’s organic matter is key to the pasture-based rotational grazing system. As described in Section 4.3, Soils, microbes within the soils effectively transport nutrients from manure and effluent to plants. Cow manure deposited in the pastures will break down naturally into organic matter and release nutrients in the process. The soluble nutrients from the manure will enter the pasture grass, underlying thatch and soil profile, and be utilized as part of the nutrient requirement of pasture grasses. Montgomery (2016) notes that high populations of dung beetles at this location will effectively bury dung pats into the soil profile in one to three days. Yost (2016) anticipates the manure nutrients will largely be utilized by the pasture grass.

**NRCS Practice Standards and the U.H. Guidebook** have established various setbacks to minimize impacts to waterways. Fences will be erected along 35-foot setbacks to exclude cows from drainageways. The 35-foot setbacks (totaling 70 feet, as setbacks are on both sides of the drainageways) will be vegetated to act as filter strips and trap soil particles and organic debris from stormwater runoff. Manure particles that do not settle out in to the buffer area could be carried into ditch waters and downstream with stormwater flows. During runoff events, ditch waters will also contain substantial organic debris, suspended sediment and nutrients from natural and other man-made sources in the watershed. The relative contribution of manure particles in the stormwater flows within agricultural ditches will be a small fraction of the total from the watershed.

**Impacts to the Nearshore Marine Environment.** During the rainfall and runoff events, the dairy’s nutrient contributions would be further diluted by additional volume of surface runoff and ditch flows. The terminus of Waiopili Ditch is a deep, muddy basin that joins the ocean through a channel cut through beach sand. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline. MRCI concluded there will be no substantial effects to marine water quality from the HDF dairy (Appendix F).

**Mitigation –Buffers.** Vegetative buffers totaling 70 feet in width – 35 feet on either side measured from the top of the agricultural ditches – will be established in keeping with the *Livestock Waste Management Guidelines* (U.H., 2010) to improve and maintain water quality and reduce erosion. Fences will be erected along the 35-foot setbacks to exclude cows from the buffer areas; vegetation along the buffer will trap soil particles and organic debris in order to minimize inputs to stormwater runoff. Vegetation in and adjacent to the ditches will be maintained to control overgrowth and minimize ditch bank soil erosion.
Additional effluent application setbacks totaling 100 feet in width – 50 feet from the top of either side of a waterway – will keep nutrient applications away from waterways.

**Mitigation - Surface Water Quality Monitoring.** A long-term water quality monitoring program has been instituted to regularly sample and analyze nutrient and chemical constituent levels of the surface waters (agricultural ditches and Waipio Pli Ditch). The monitoring program and methods will be established to meet the CWB quality assurance/quality control requirements. The ongoing testing program will provide feedback to the dairy management team regarding changes in water quality. Data from the surface water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

Increases in nutrients as a result of dairy establishment or operations can inform modification of the operation's nutrient management. Modifications to the timing and placement of effluent can be made; the rate of application can changed; different crops can be utilized to increase uptake by plants; and the number of cows can be changed. Nutrient management is a dynamic process that is informed by monitoring a number of parameters; the ability to monitor nearby water bodies for changes in nutrients is an additional check that provides data to be publically shared.

**Mitigation - Ocean Water Quality Monitoring.** A long-term ocean water quality monitoring has been instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze nutrient and chemical constituent levels in the nearshore marine waters. The ongoing testing program will provide feedback to the dairy management team regarding changes in water quality. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

### 4.18 ROADWAYS AND TRAFFIC

In this section, analysis for the committed herd size of 699 milking cows is presented. Refer to Section 4.24.1 for the traffic-related conditions related to the future contemplated herd size of up to 2,000 milking cows.

**Existing Conditions – Roadways and Traffic**

Primary access to the site is via Māhā‘ulepū Road, a two-way, two-lane road, which is accessible from Kōloa Road (Highway 530) via Ala Kinoiki Road, a two-way, two-lane County bypass road that provides mauka-makai access from Māhā‘ulepū Road to Po‘ipū Road. Secondary access would be provided southeast of the project site from Po‘ipū Road, a two-way, two-lane County collector road, which connects to Māhā‘ulepū Road. Kōloa Road is a two-way, two-lane County road that runs from Kaumuali‘i Highway to the west to Maluhia Road to the east (Figure 4.18-1). Traffic for 2009-2010 was measured along Ala Kinoiki Road at 8,000 vehicles per day, and along Kōloa Road at 6,500 vehicles per day (Fehr & Peers in COK, 2015a).

The HDF site is accessed from Māhā‘ulepū Road via a network of unimproved private agriculture haul roads. The agricultural roads are utilized by trucks accessing quarry operations and agricultural properties in the vicinity of the HDF site. Privately owned and rental vehicles travel the rough, unpaved roads to access beaches east of the HDF site. The private landowner, Mahaulepu Farm, allows access during daylight hours and locks gates across the access points at night. Typically these vehicles follow a dirt road that begins at the terminus of Po‘ipū Road near the Grand Hyatt Kaua‘i.
4.18.1 Probable Impacts and Mitigation Measures - Roadways and Traffic

Impacts that would be considered significant related to traffic could include:

- A significant increase in traffic on Ala Kinoiki or Po’ipū roads; significant traffic delays for a substantial number of motorists; or
- Changes to traffic patterns or road infrastructure that affect pedestrian, bicyclist or motorist safety.

**Short-term Impacts and Mitigation Measures – Roadways and Traffic**

The proposed project is not expected to significantly increase traffic in the project vicinity. The construction-related traffic will end after project completion.

There will be no significant change to traffic patterns or infrastructure related to the public roads.

**Long-term Impacts and Mitigation Measures – Roadways and Traffic**

Traffic operations along Māhā’ulepū Road and the surrounding County roads are expected to continue to operate at acceptable levels of service during peak hours of traffic. The projected increase in vehicle movements related to HDF operations is shown in Table 4.18-1, and includes daily employees accessing the site, milk tanker and supply trucks every two days, and truck with stock trailer, for a total of 12 additional vehicle trips per day. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area.

<table>
<thead>
<tr>
<th>Traffic Data</th>
<th>*2009-2010 Baseline</th>
<th>w/ 699 Herd Dairy</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ala Kinoiki Road</td>
<td>8,000</td>
<td>8,012</td>
<td>0.15%</td>
</tr>
<tr>
<td>Koloa Road</td>
<td>6,500</td>
<td>6,512</td>
<td>0.18%</td>
</tr>
</tbody>
</table>

*Source: Fehr & Peers 2014 in County of Kaua’i 2015b, South Kaua’i Community Plan

There will be no significant change to traffic patterns or infrastructure related to the public roads. Construction equipment mobilization will comply with Hawai‘i Department of Transportation and County requirements. Delivery trucks and milk tanker trucks will be in compliance with State and County size and weight limits; no oversized vehicles will be used for ongoing operations.

The potential traffic impact based on the contemplated herd size is discussed in Section 4.24.
Figure 4.18-1  Major Roads in Vicinity
4.19 AIR QUALITY, ODOR, AND GREENHOUSE GAS

Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. Odors, greenhouse gas (GHG) emission rates, and potential fugitive dust for the proposed dairy operations were estimated based on published research values and local weather data. The full report, Hawai‘i Dairy Farms Air Emissions and Odor Evaluation Technical Report, is included as Appendix I of this EIS.

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants:

1. Particle Pollution (often referred to as particulate matter, PM_{10} and PM_{2.5}),
2. Sulfur Dioxide (SO_{2}),
3. Nitrogen Dioxide (NO_{2}),
4. Ground-level Ozone (O_{3}),
5. Carbon Monoxide (CO), and

The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) as provided for under HAR 11-59 that are as strict or, in some cases, more strict than the NAAQS. In addition to the six criteria pollutants, the State established a SAAQS that includes hydrogen sulfide (H_{2}S) (resulting from volcanic gases). The State has also established standards for air pollution control such as fugitive dust emissions emanating from construction activities (Hawai‘i Administrative Rules [HAR] Chapter 11 Title 60.1 [11-60.1]). These standards prohibit any visible emissions of fugitive dust from construction activities at the property line. The State standards are administered by the Hawai‘i Department of Health (DOH), Clean Air Branch (CAB).

No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH_{4}) from enteric fermentation, and both methane and nitrous oxide (N_{2}O) emissions from manure application.

In the following sections, analysis for the committed herd size 699 milking cows is presented. Refer to Section 4.25 for the air quality, odor and greenhouse gas analysis for the future contemplated herd size of up to 2,000 milking cows.

### 4.19.1 Air Quality

**Existing Conditions – Air Quality**

Emissions associated with animal livestock operations include fugitive dust. GHG emissions are discussed separately in Section 4.19.3.

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day. Applying the
emission rates from this available literature to HDF, therefore, greatly overestimates potential emission, as cows in the rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Methodology – Air Quality Modeling

Natural sources of air pollution emissions that could affect the project area at times but cannot be quantified accurately include the ocean (sea spray), plants (aero-allergens), wind-blown dust, and perhaps distant volcanoes on Hawai‘i Island.

Fugitive dust concentrations were modeled for HDF by applying the PM rates from available literature, which measured PM from a “dry lot” used for traditional confinement dairies. Using these dust rates in the model, therefore, over-estimate the potential quantity of PM, because HDF will utilize a pasture-based system. The HDF system will have cows off pasture just two hours each day.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM$_{10}$ and PM$_{2.5}$) measured on the island of O‘ahu. This was considered the total impact and is compared to the State ambient air quality standards in Table 4.19-1. Only the contemplated herd size of up to 2,000 milking cows was modeled, as at the lower threshold of 699 cows the potential fugitive dust impact would be negligible.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Average Time</th>
<th>Concentration ($\mu g/m^{3}$)</th>
<th>Background</th>
<th>Total Impact</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM$_{10}$</td>
<td>24 hr</td>
<td>2.01</td>
<td>39</td>
<td>41.01</td>
<td>150</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>annual</td>
<td>0.33</td>
<td>15</td>
<td>14.83</td>
<td>50</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>24 hr</td>
<td>0.23</td>
<td>12</td>
<td>12.23</td>
<td>35</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>annual</td>
<td>0.04</td>
<td>3.0</td>
<td>3.94</td>
<td>15</td>
</tr>
</tbody>
</table>

Probable Impacts and Mitigation Measures - Air Quality

Impacts that would be considered significant related to air quality could include:

- Dust and debris generated during construction of the dairy facilities; and
- On-going dairy operations increasing odor, GHG, and air pollutants in the region.

Short-term Impacts and Mitigation – Air Quality

Short-term impacts may consist of exhaust emissions from construction equipment and increased vehicular activity during the construction phase, and fugitive dust emissions during soil excavation. Exhaust emissions from vehicle and heavy equipment may be perceptible along public roads, however, emissions from on-site work will dissipate before reaching public access areas due to the remote dairy location. Vehicular access to the site during construction will include limited delivery of construction materials and heavy equipment for site work, and daily vehicle access to the site by construction workers.
In accordance with Title 11, Hawai‘i Administrative Rules Chapter §11-60.1 “Air Pollution Control”, control measures are required to prevent or minimize any fugitive dust emissions caused by construction work from affecting the surrounding areas. Short-term construction dust can be reduced through implementation of dust control measures as recommended by DOH Clean Air Branch. Relevant control measures include:

- Using water to control dust on disturbed surfaces and haul roads;
- Limiting the disturbed area at any given time, and/or mulching or stabilizing inactive areas that have been worked; and
- Establish and monitor speed limits for trucks on-site.

Moving construction equipment and workers to and from the project site during off-peak traffic hours will help to mitigate exhaust emissions. Equipment and materials requiring heavy truck transport will be moved during periods of low traffic volume. Daytime work hours for construction will be set to avoid peak traffic hours in the project vicinity. Details of construction plans and contractor coordination will be determined in conjunction with contractor selection. Construction activities will comply with the State Air Pollution Control rules.

**Long-term Impacts and Mitigation – Air Quality**

Long-term impacts from dairy operations may occur from particulate matter in the form of dust. Utilizing published fugitive dust rates to the model overestimates potential particulate matter from cows at HDF moving along dairy raceways and paved areas. Only the contemplated herd size of up to 2,000 milking cows was modeled, as at the lower threshold of 699 cows the potential fugitive dust impact would be negligible. The estimated concentration for PM$_{10}$ is 2.01 µg/m$^3$ per 24-hour period, well below the State standard of 150 µg/m$^3$. The estimated concentration for PM$_{2.5}$ is 0.23 µg/m$^3$ per 24-hour period, well below the Federal standard of 35 µg/m$^3$ (Table 4-19.2). Dust control (e.g. watering walkways and washing down the holding yards) will be utilized as needed to keep any particulate matter on site.

The total annual particulate matter emissions were also estimated for PM and greenhouse gases (GHGs). Total annual emissions (in tons per year) are typically estimated for potential permitting applicability. Results of the estimate for a herd size of 699 mature dairy cows for PM was 0.6 tons per year. The project will not require any permits under the Clean Air Act, or State of Hawai‘i counterpart.

Potential impacts related to the potential contemplated herd size can be found in Section 4.25.1.

**4.19.2 Odor Assessment**

Odor refers to the combined effects of a mixture of gases on the sense of smell. Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels based on dairy facility design and established modeling methods. Local weather data was used in conjunction with the AERMOD (version 1) modeling system to evaluate odors documented for dairy heifers and effluent ponds.

**Existing Conditions - Odor**

The project area and surrounding acreage have been leased to various tenants for ranching and diversified agricultural operations since the late 1990s, when wide-scale sugar cultivation ceased.
and the Kōloa Mill closed. W.T. Haraguchi Taro Farm utilizes 38 acres for the cultivation of taro, surrounded on three sides by the HDF project. The taro farm also maintains a herd of sheep to keep weedy plants in check surrounding the lo‘i kalo (taro ponds).

Predominant winds blow towards the southwest with an average wind speed of 10 miles per hour (Figure 4-1.1). The developed area nearest HDF is an agricultural subdivision east of Ala Kinoiki Road, currently with two homes. The Grand Hyatt Kaua‘i and the Weliweli residential area west of Ala Kinoiki are both 1.6 miles from the south-westernmost corner of the HDF pastures, and 2.5 miles from the dairy facilities, which includes the milking parlor and effluent storage pond (Figure 4.4-3). Two private recreational facilities – the easternmost edge of the Po‘ipu Bay Golf Course and CJM Country Stables – lie 1.6 miles from the facilities of the proposed dairy.

**Methodology – Odor Assessment**

Odor is perceived when one or more chemical substances in the air come in contact with various human sensory systems. A human’s sense of smell is derived from the olfactory receptors in the top, back of the nasal cavity. Scientific methods to measure odor have been developed for use in sensory evaluation related to the trade industry (for perfumes, coffee, wine, etc.) and for regulatory monitoring and compliance. International standards dictate the scientific methods and practices of odor measurement which are objective, quantitative, dependable and reproducible. The perception threshold of an “odor unit” is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor (Arcadis, 2016).

No regulatory threshold exists for dairy farm odors, and determining an odor threshold is complicated by lack of suitable data on odor levels associated with annoyance and complaint. A 2004 study suggested 6.5 OU/m³, 1-hour averaging and the 99.5th percentile at the receptor as appropriate criteria (Wang & Feitz, 2004). The 6.5 OU/m³ is described as the point at which 50 percent of a population can successfully detect an odor. The 1-hour averaging and 99.5th percentile describes the time over which the 6.5 OU/m³ may be detected. With 8,760 hours in a year, 0.5 percent of the year equates to 44 hours. Therefore, the 6.5 OU/m³, 1-hour averaging at the 99.5th percentile means that 50 percent of the population may detect an odor during just 44 hours during a one-year period. The modeling considers the worst-case meteorological conditions, so it is likely odor detection beyond the HDF boundaries will be even less frequent (Arcadis, 2016).

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. The odor model assumed the total pasture area was 563 acres, which overestimates the actual area used as pasture. Farm roads, cow walk/raceways, and vegetated buffers along drainages total nearly 70 acres of areas utilized for transit or excluded by fencing. The dairy facility will occupy less than 10 acres of the total project area.

Measures of odors for the evaluation conducted for HDF utilized data relevant to the odor emission source. Odor rates for the effluent storage ponds were published in Dairy Australia in 2008, based on analysis of 30 ponds over 12 months in Australia. Odor emission rates for manure of dairy heifers were determined in a trial conducted at the Pennsylvania State University (Topper et al., 2008). Emission rates for the dairy buildings were based on Jacobson et al. (2001).
Probable Impacts and Mitigation Measures - Odor

Odor isopleths (a line used to map all points having the same numerical value) were created using the results of AERMOD computer modeling that utilized four types of input data: emission source information, receptor locations, meteorology, and model specific control options (site and project specific data options).

Short-term Impacts and Mitigation – Odor

As the herd is established at HDF, odor will be below the modeled quantity as fewer animals will be on site. In the short-term, there will be no odor impacts.
Long-term Impacts and Mitigation – Odor

Unlike a traditional confinement dairy facility, the majority of manure will be deposited directly on the pasture where it will break down and be incorporated into the soil within a one- to three-day period. Manure collected from barns and paved areas will be washed into a settling pond for re-use on the pastures. Manure is cycled through the ponds on a regular basis guided by irrigation needs; over a period of roughly 45 days, effluent is completely utilized and replaced.

Figure 4-19.2 displays results of modeling the annual extent of the 6.5 OU/m³ odor level for the herd size of 699 milking cows. The colored area depicts the 99.5th percentile threshold of 6.5 OU/m³. Within the detection area (Figure 4.19-1 odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year. The odor isopleth does not extend beyond the dairy farm boundary more than approximately 1,670-feet (within one-third of a mile), and does not reach recreational or residential areas.

Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site (Figure 4.19-1).

Windbreaks, also known as shelterbelts, are used for a variety of purposes including reduction and interception of airborne odors. As a best management practice, Casuarina cunninghamiana will be planted along the east south-east boundary of the dairy site. Locally known as ironwood, this tree was introduced to Hawai‘i from its native Australia in the late 1800s.

Potential impacts related to the potential contemplated herd size can be found in Section 4.25.2.

4.19.3 Greenhouse Gases

No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist. However, livestock and agriculture as an industry contributes to greenhouse gas emissions. During the public scoping period, inquiries about the project’s potential contribution to greenhouse gas were received. As the dairy has not been established, published scientific models were applied to calculate probable emissions from the pasture-based dairy operations. Results are presented here, and the probable impacts assessed.

When sunlight reaches Earth’s surface, it can either be reflected back into space or absorbed by Earth. Once absorbed, the planet releases some of the energy back into the atmosphere as heat (also called infrared radiation). Greenhouse gases (GHGs) like water vapor (H₂O), carbon dioxide (CO₂), and methane (CH₄) absorb energy, slowing or preventing the loss of heat to space. In this way, GHGs act like a blanket, making Earth warmer than it would otherwise be. This process is commonly known as the “greenhouse effect”. Human activities have contributed substantially to climate change by adding CO₂ and other heat-trapping gases to the atmosphere. Human activities, such as the burning of fossil fuels and changes in land use, release large amounts of CO₂, causing concentrations in the atmosphere to rise.

GHG emissions or the “carbon footprint” related to transporting fluid milk are not considered as part of this EIS. Carbon footprint is a term used to measure the amount of net carbon dioxide or other carbon compounds emitted into the atmosphere by the activities of an individual, company, country, etc. Carbon emission calculators have been developed to measure the carbon footprint of
various activities, and rely on assumptions which vary greatly. Carbon calculators have been found
to differ by an order of magnitude (Peck, 2010). Most carbon calculators identify direct greenhouse
consumption, such as household energy use, transportation distances and methods. Indirect carbon
emissions relate to food choices, recycling habits, leisure activities and shopping habits (Fry, 2008).

The primary sources of GHG gases in the United States are: electricity production (41 percent);
transportation (27 percent); industry (21 percent); commercial and residential (12 percent);
agriculture, including livestock (9 percent) and land use and forestry (13 percent) (EPA, 2015).
Methane from enteric fermentation, and both methane and nitrous (N\textsubscript{2}O) emission from manure
application are gases that can contribute to greenhouse gas (GHG) emissions. The Kaua‘i Island
Utility Cooperative published its CO\textsubscript{2} emission for energy generation between 2010 and 2013. The
range is from more than 302,000 tons of CO\textsubscript{2} in 2010, to less than 294,000 tons in 2013.

Removing carbon dioxide from the atmosphere is known as “sequestration”. Natural sequestration
is a biological process that occurs during photosynthesis of plants.

**Existing Conditions – Greenhouse Gases**

Prior to HDF’s lease of the property, the land was used for a herd of approximately 250 beef cattle.
Currently, the site consists of agricultural equipment in operation necessary to grow an area of
grass in the northeast corner of the farm. With the current minimal equipment and no cows
currently present, GHG emission rates are negligible.

**Methodology – Greenhouse Gases**

Estimates of GHG emission rates from a pasture-based dairy were calculated using the
Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas
Inventories (2006). Parameters for dairy cattle in Oceanic (warm) climates were selected as most
applicable to conditions at HDF. Estimated emissions of methane and nitrous were converted to
carbon dioxide equivalents (CO\textsubscript{2}e) using the IPCC’s AR3 global warming potential (GWP) that
relates the GHG to CO\textsubscript{2} (Arcadis, 2016).

**Probable Impacts and Mitigation Measures - Greenhouse Gases**

The EPA issued the Final Mandatory Reporting of Greenhouse Gases Rule (GHG Reporting Rule), which
became effective on January 1, 2010. The GHG Reporting Rule requires annual reporting of GHG
emissions from large sources in the United States, including suppliers of fossil fuels or industrial GHGs;
manufacturers of vehicles and engines; and facilities that emit greater than 25,000 metric tons per year
(mtpy) each of CO\textsubscript{2} and other GHGs. Permits and reporting for the stationary source emitters with the
potential to emit 25,000 metric tons per year or greater of GHGs are required under the Clean Air Act.
Small businesses and farms are not included or required to report.

**Short-term Impacts and Mitigation – Greenhouse Gases**

Short-term impacts that could contribute to greenhouse gases are those identified related to
construction in Section 4.19.1, Air Quality. Mitigation measures to reduce emissions are outlined in the
Air Quality section. Contributions to GHG from implementation of the dairy over the short-term will not
be significant.
Long-term Impacts and Mitigation – Greenhouse Gases

Long-term operational impacts were modeled using the IPCC guidelines and conversions, and estimated the emissions potential for GHG at the dairy at the committed herd size of 699 milking cows to be 2,693 CO₂e metric tons per year (2,969 US tons). This is equivalent to the GHG generated by 170 4-person households, including home energy consumption, transportation and waste (https://www3.epa.gov/carbon-footprint-calculator).

Operational practices to protect air quality by reducing nitrogen emissions will come from guidance in NRCS Conservation Practice Standard 590, Nutrient Management. Application of nutrients must be adjusted to minimize negative impacts of GHG release to the environment through adjustments to the source, timing, amounts, and placement of nutrients. Specific practices to be utilized at HDF include: slow release fertilizers; nutrient enhancement technologies; and stabilized nitrogen fertilizers.

To reduce use of fossil fuels at the dairy, HDF will install solar photovoltaic power generation to provide onsite power. A roof-top mounted system using solar panels will be designed to produce 500 kilowatt hours.

While the presence of cows may increase GHG, a long-term beneficial impact of the grazing fields is the sequestration of carbon as CO₂ captured by the process of from photosynthesis by the grass. According to recent studies in the Soil Science Society of America Journal, converting formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, which enhances soil quality, grass production, and has the potential to offset up to one-third the annual increase in CO₂ production of an area (Machmuller, 2015).

Estimated GHG related to the potential contemplated herd size can be found in Section 4.25.3.

4.20 SUMMARY OF PROBABLE IMPACTS AND CONTEXTUAL ISSUES (COMMITTED HERD SIZE)

This section discusses the dairy farm’s potential secondary effects and the cumulative impacts on the environment at the committed herd size of 699 milking cows.

4.20.1 Interrelationships and Cumulative Environmental Impacts

Hawai’i Dairy Farms is being implemented to make productive use of lands designated as Important Agricultural Land with food production and a dairy to produce fresh milk and milk products. The dairy farm is an agricultural use planned within the existing Māhāʻulepū agricultural area. Other known uses underway or planned in the region, with the dairy farm in operation, will contribute to the contextual setting of interrelationship and cumulative effects.

Agricultural and Commercial Uses in Māhāʻulepū Valley

Surrounding agricultural operations and activities within the Māhāʻulepū sub-watershed include:

- Vasconcellos Cattle – cow-calf operation (adjacent, northwest)
- Palama / Māhāʻulepū Cattle – head beef cattle (adjacent, east)
- CJM Country Stables – commercial guided horseback riding (not adjacent, south)
- Māhāʻulepū Quarry, Jas. W. Glover, Ltd – sand and limestone aggregate (not adjacent, east)
- W.T. Haraguchi Taro Farm – taro cultivation; approx. 80 sheep (within HDF site)
- Pioneer Parent Seed Co. – recently vacated; land no longer in cultivation (adjacent, south)
- Banana Farm – approximately 10 acres (not adjacent, southeast)

**Planned Development in the Kōloa - Po'ipū Region**

Currently, there are several new agricultural enterprises planned in the vicinity, along with other public and private development and redevelopment efforts in the Kōloa Town and Po'ipū area. The South Kaua'i Community Plan (County of Kaua'i Planning Department, July 2015) summarizes planned developments in the region. Some may be on hold pending finances or funding:

- The Kōloa - Po’ipū Regional Wastewater Reclamation Facility is a privately-owned (HOH Utilities, LLC) and operated regional wastewater reclamation facility and wastewater collection system.
- The County of Kaua'i Department of Water: water system improvements to support residents and businesses for planned growth in the Kōloa Town and Po'ipū communities
- Kōloa Landing Resort: adding 200 new residential units in Po'ipū by 2016
- Sheraton Kaua'i Resort Expansion: 394 units on 10.7 acres; planned conversion to timeshare
- Kukui’ula master planned resort residential community: 1,000 acres in development phases, including golf course, clubhouse, spa, commercial centers, and residential units
- Kukui’ula Affordable Housing project: 60 affordable units
- Kōloa Marketplace: 71,000 square-feet (sf) mixed-use commercial center
- Waihohonu: 50-unit residential development at the old Kōloa Camp area
- Village at Kōloa Town: 34 residences and 45,000 sf retail office
- Kōloa Creekside: 72-unit multi-family residential project in Kōloa
- Paanau Village, Phase 2: 50-unit multi-family residential project in Kōloa Town
- Wainani at Po'ipū: 69 single-family homes by DR Horton
- Kahuna at Po'ipū Golf Resort: new phase build-out
- Pili Mai Community in Po'ipū: 191 luxury condominiums by Brookfield Homes Hawai‘i
- Royal Palms at Po’ipū Beach: 100-unit resort condominium development
- Po’ipū Gateway Mixed-use Village: 1,100 new residential units and mixed use commercial
- Koa’e Workforce Housing Development: 130 to 150 multifamily affordable housing residential units (County of Kaua‘i, 2015)

**Probable Cumulative Impacts**

Existing commercial and agricultural uses within the Māhāʻulepū sub-watershed have the potential to impact natural resources, notably use of potable water, and to contribute to environmental impacts in the region, notably nutrient inputs to groundwater and the nearshore marine environment from on-site sewage disposal systems. Nearly 2,500 new residences or room units are listed in the South Kaua'i Community Plan, ranging from high-end single family resort homes to affordable housing, and including commercial and retail development. Recognizing the number of development projects planned and probable impacts, alongside potential impacts from the dairy farm, combine to provide insight to probable cumulative impacts. Qualitative or quantitative analyses were conducted in this EIS for pest insects, demographic and economic conditions, groundwater resources, surface water and nearshore marine resources, roadways and traffic, and air quality, odors and greenhouse gases.
Pest Insects

There are no native, protected or endangered insect species within the HDF site. Flies identified on the HDF site using manure from neighboring livestock as bait for invertebrates include two flies associated with livestock (the stable fly and the horn fly), and the greenbottle fly, often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could be brought inadvertently to the dairy and could transfer to manure as a food source.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). IPM disrupts reproduction with appropriate means at key points in the pest's life cycle. Used in Hawai‘i for decades, dozens of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1985 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species. An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which can bury manure in one to three days and thereby incorporate it into the
soil. This interrupts the egg to fly lifecycle, which ranges from 7 to 20 days depending on the species. Populations of dung beetles found on Kaua‘i and those species already in Māhā‘ulepū Valley, will expand with the growing manure food source, thus increasing and speeding breakdown of manure.

Area ranchers may work together with the State Department of Agriculture to request translocation of dung beetle species already on Kaua‘i. This would supplement beetles on the HDF site and at other ranches with additional beetle species to more quickly and effectively bury manure. Different species are active at different times (day versus night), and perform different roles (burying deep versus shallow) to integrate manure into soils.

In the Kōloa- Poʻipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken dung. Beef cattle graze in the region on agriculturally-zoned lands along Ala Kinoiki Road between Kōloa and Poʻipū, and it is likely that livestock-related flies are found in this region, which is more than 1.5 miles from HDF. Localized controls are needed in the Kōloa- Poʻipū area to address breeding sites in and amongst the food and animals wastes within the region to reduce pest populations.

**Demographic and Economic Conditions**

Implementation of the dairy farm will provide approximately 11 direct and indirect full-time equivalent jobs, including 5 farm jobs and 6 indirect jobs on Kaua‘i, with 3 additional indirect jobs on O‘ahu at the committed herd of 699 milking cows. The economic impacts are summarized in Section 4.15, and the complete study is provided in Appendix J. The increase in agricultural employment will add to local economic activity. Once fully operational with a herd of 699 mature dairy cows, annual direct-plus-indirect sales are estimated annually at $8.1 million on Kaua‘i, with an additional $2 million on O‘ahu. These sales would generate $60,000 annually in net income to the State, mostly from excise taxes on sales. The dairy farm will add agricultural industry employment, provide net revenues to the County and State, and bring fresh milk and milk products to advance local food sustainability.

**Groundwater Resources**

**Demand - HDF:**
The dairy farm would use 30,000 gpd of potable water for the committed herd size of 699 milking cows. This includes 25 gpd per cow for drinking water, and less than 18 gpd per cow for wash water in the milking parlor. The existing, on-site agricultural well will be re-activated and utilized; its yield during the sugarcane planation era was 3 million gallons per day. The demand is well within the aquifer yield.

Nearly all of the potable water used will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Potable water used in the milking parlor and dairy facilities will be captured and recycled in irrigation water, and some percentage of the livestock drinking water will be returned as effluent and ultimately utilized by the pasture grass. The modest potable water use rate for dairy operations, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the nearest County potable water well (Kōloa Well F), will result in no adverse impacts to ongoing use of groundwater in the unweathered volcanic series, which is the source of potable water (TNWRE, 2016).
Demand - Kōloa-Po’ipū:
Total demand for municipal potable water in the Kōloa-Po’ipū region was 2.3 MGD (CWRM, 2008). Documented use rates for residential and resort units were last published for Kaua‘i in the Department of Water’s long-range plan, Water Plan 2020 (COK, 2001). For planning purposes, single-family demand assumed was 500 gpd per residential unit, and 350 gpd per resort unit. Golf course irrigation rates are estimated to average 51,000 gpd per golf course statewide (CH2MHill, 2013). Municipal water demand for the three golf courses in the Kōloa-Po’ipū region is therefore estimated at 153,000 gpd.

The adjacent, developed Kōloa-Po’ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase from the year 2010 population of 67,100 residents to 84,400 in 2030, an increase of 17,300 residents over the 20-year period. The South Kaua‘i population is estimated to reach 16,855 in 2035. Compared to the remainder of the island, population growth for this region is projected to increase to encompass 19.2 percent of the County population; in 2010 the region contained roughly 17.4 percent of the County population (COK, 2015a).

Water resources must therefore be carefully managed to accommodate the projected growth and water demand in the region through 2035.

Groundwater Quality – HDF:
The groundwater assessment determined there is no hydrologic connection between the shallow groundwater body in the alluvium and the source of potable water in the unweathered volcanic series. The poor permeability of the alluvium means that groundwater flow would be modest. Surface water is estimated to carry three times the nutrients than groundwater moving through the alluvium on the valley floor (see following section, Surface Water and Nearshore Marine). Nutrients added by the dairy operation will have no impacts to the County drinking water well, the source of potable water within the deep volcanics.

Groundwater Quality – Kōloa-Po’ipū:
The Kōloa karst topography and lava tube systems that straddles the Waikomo Watershed may provide transport of injection well and cesspool effluent to the Makauwahi Cave/sinkhole lava tube system in the Māhā‘ulepū sub-watershed. The CWB Sanitary Survey estimates groundwater and coastal waters of south-east Kaua‘i are being contaminated with roughly 3 MGD of wastewater daily (CWB, 2016).

Effluent Production – HDF:
The total generation of effluent captured by the settling and storage ponds for re-use on pastures is estimated at 10.9 gpd per cow. Including minimal input from calves within the calf sheds, the total wastewater volume to be collected from dairy facilities is 13,225 gpd (0.013 MGD) for the committed herd size. This includes required wash water of 17.4 gpd per cow (see Demand – HDF, preceding). The wastewater from dairy facilities will be re-applied to grow pasture grass, a locally available food source which will provide 70 percent or more of the herd’s nutritional requirements.

Effluent Production – Kōloa-Po’ipū:
An estimated at 1.17 MGD of wastewater disposal was processed at treatment plants in 2010 (SSFM, 2016). This is in addition to estimates of wastewater disposed of through on-site systems; see Groundwater Quality - Kōloa-Po’ipū, preceding. An evaluation of Kaua‘i’s infrastructure through the
year 2035 predicts the island will face inadequate wastewater treatment and solid waste capacity (SSFM, 2016). For the year 2035, wastewater volume for the region is projected to more than double to 2.42 MGD.

Reclaimed wastewater from sewage treatment plants is used to both treat wastewater and provide nutrients to landscaping and golf courses. The 2013 Update of the Hawaii Water Reuse Survey and Report (CWRM, 2013) reports that the key factor for reclaimed water use at most Kaua‘i County water reuse projects is primarily wastewater disposal. Reclaimed wastewater is derived from sewage that undergoes preliminary treatment (removal of large debris), then primary and secondary treatment to settle out solids and organic materials and manages microorganisms like bacteria, protozoa, ciliates and worms that eat the organic material. Advanced treatment, also known as tertiary treatment, can include additional filtration and disinfection such as ultra-violet light or chlorine, to reduce pathogen levels. Additional nutrient removal through uptake by flora in treatment lagoons or constructed wetlands, though often the benefit of retaining nitrogen and phosphorus in reclaimed water makes it useful for irrigation. The extent of disinfection is reflected in whether the effluent water is characterized as R-2 or R-1 reclaimed water. Most reclaimed water projects blend the treated water with surface or brackish water for golf course and landscape irrigation.

The Po‘ipū Bay Resort Golf Course, located 1.6 miles southwest of the proposed HDF facilities, averaged 100,000 gpd (0.1 MGD) use of R-2 reclaimed water in 2013. The wastewater source used is from the Grand Hyatt Kaua‘i wastewater treatment facility. Reclaimed water is mixed with Waita Reservoir and stream water for irrigation. The percentage of recycled water varies throughout the year depending on rainfall volumes. An on-site injection well operated by golf course maintenance personnel is used to dispose of excess recycled water during extended rainy conditions when irrigation is not required (CWRM, 2013).

Kiahuna Golf Course is located in the Waikomo watershed in Po‘ipū, to the west of Māhā‘ulepū Valley. R-2 water from the Po‘ipū Water Reclamation Facility (WRF) has been used since 1984 for irrigation, blended at 40 to 60 percent with water from Waikomo Stream. DOH guidelines require a 500-foot buffer between the point of application and nearby properties, however, R-2 water has been used via spray irrigation along fairways lined with single-family homes as this use was approved and initiated prior to passage of the DOH guidelines. The reclaimed water used at the course has been upgraded to R-1. On-site injection wells are available for disposal of wastewater when effluent does not meet R-1 water standards, or if the golf course does not require irrigation due to heavy rain events (CWRM, 2013).

The golf course is considered a convenient effluent disposal option of the Po‘ipū WRF as it can typically utilize the entire daily flow from the facility. In 2013, Kiahuna Golf Course used 360,000 gpd (0.36 MGD) of reclaimed water to partially meet irrigation demand. Waikomo Stream has partially satisfied demand with 0.3 MGD for irrigation, but peak summer irrigation demand for reaches 0.7 MGD, which can only be met with reclaimed water supply. The R-1 water from the Po‘ipū WRF is also provided though the golf course system to the nearby commercial properties. Kōloa Landing receives 70,000 gpd (0.07 MGD) for landscape irrigation.

Surface Water and Nearshore Marine Resources

The surface waters crossing the dairy farm site include some input from an intermittent stream above the site and drainage collected in agricultural ditches developed during the sugarcane
plantation era. These surface waters are not a recreational resource and are not used by the public, even near the ditch terminus at the ocean. With an on-site manager for the new agricultural endeavor utilizing best management practices to protect water quality through nutrient and soil management, current run-off would be reduced. HDF will follow its NRCS reviewed Conservation Plan to minimize sediment, nutrient and pathogen inputs to the surface waters in these drainages.

The groundwater body in the alluvium is hydrologically disconnected from the County well water in deep unweathered volcanics. Episodic, seasonal rainfall events cause groundwater in the alluvium to rise and intersect with the deep agricultural ditches in the vicinity of HDF monitoring wells 1 and 2. Such episodes are calculated to average 10 days annually, which would result in a modest amount of groundwater containing nutrients to discharge into the surface ditches. The amount of nutrients estimated from HDF operations released to surface water is calculated at 10,000 pounds of nitrogen and 900 pounds of phosphorus annually.

An estimate of nitrogen input to the marine environment from resort landscaping fertilization and domestic wastewater in the Po’ipū region is calculated to be 38,510 pounds of nitrogen annually. This is 3.8 times greater than the estimate from dairy operations. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. Significantly different soils mean that nutrient inputs from the Po’ipū region are constant throughout the year, and no mitigation is applied to reduce the quantities.

Working closely with DOH and NRCS, dairy farm staff are helping to improve understanding of factors that affect local water quality. Adherence to strict measures to protect water quality through proper irrigation management practices and re-analysis of nutrient inputs and outtake, the dairy farm will balance nutrient needs of pasture grass as well as improve the water-holding capacity of soils. Occasional nutrient run-off may allow some diluted nutrients to bypass mitigation measures to be employed, but will have no significant deleterious effect on the area’s surface water quality. Nearshore water quality at the Waiopili Ditch outlet and along this coastline will not be significantly degraded by inputs from HDF.

Roadways and Traffic

The development of the dairy farm facilities and future operations is not expected to have a significant impact on traffic operations in the area roadways. The projected increase in vehicle movements related to HDF operations for the committed herd size of 699 milking cows is approximately 12 additional vehicle trips per day. Traffic data in 2009 to 2010 on Ala Kinoiki Road was 8,000 trips per day, and on Kōloa Road, 6,500 daily trips, for a total of 14,500 vehicle trips in the vicinity. An additional 12 trips daily would have a minimal effect on traffic conditions at County roadways in the area.

Air Quality/Odors/Greenhouse Gases

Results from the air quality odor model indicate that any long-term impacts on air quality in the project area due to dairy farm operations would be negligible. Under the worst-case meteorological conditions, concentrations of odor are limited to within 800 feet of the dairy farm boundary and do not reach residential or resort areas. With active management of the dairy operations, there will be no noticeable odors or reduction of air quality in the surrounding area. The limited number of worker vehicles and trucks will create nominal increase in air emissions, not significantly contributing to the air emissions generated by vehicles in the region. Contributions to greenhouse gas will not be significant.
According to the 2013 Update of the Hawaii Water Reuse Survey and Report (CWRM, 2013), effluent from sewage treatment plants, referred to as reclaimed water, is blended into the Po‘ipū Bay Resort Golf Course lake at a concentration of 20 to 40 percent with Waita Reservoir water. Irrigation of the first three holes on the golf course uses up to 60 percent reclaimed water, as maintenance personnel have observed the benefit of added nutrients. A slight odor is noted when the reclaimed water is spray-irrigated, and is reported to be more noticeable at the first three holes where the higher concentration is used (CWRM, 2013). The irrigation of effluent located within the recreational area, creates an odor source in close proximity to the resort.

4.20.2 Potential Secondary Effects

Local Milk Production and Food Sustainability. The creation of Hawai‘i Dairy Farms will produce substantial secondary effects in terms of local milk production and increased food sustainability. When the dairy matures to full capacity with a committed herd size of 699 milking cows, it will produce approximately 1.5 million gallons of fresh, local milk each year for the residents of Hawai‘i. The 1.5 million gallons of locally produced milk will reduce Hawai‘i’s 90 percent dependence on milk shipments from the U.S. mainland. Potential future processing of fluid milk into soft cheeses and yogurt could provide value-added products for HDF or procurers of the fluid milk.

Indirect Employment. For the development period of the dairy, indirect employment during the construction period based on state employment multipliers is expected to average 16 jobs on Kaua‘i and an additional 8 indirect jobs on O‘ahu. When the dairy is operational at the committed herd size, approximately 6 additional indirect jobs will be created on Kaua‘i and another 3 indirect jobs created on O‘ahu. These full-time equivalent jobs are in addition to the direct HDF job creation included in Section 4.15.

Source of Calves for the Local Ranching Industry. Over the long-term, dairy operations will provide a source of calves for the local ranching industry and expand the market for ranch-related additional goods and services from local vendors.

Offsite Herd Management. The committed herd size of 699 milking cows at the Māhāʻulepū site relates to a permitting threshold that references the count of mature milking cows. Animals in various stages of lactation and rest will be transferred between HDF and existing Kaua‘i ranches as needed for animal health and dairy productivity. Makoa Ranch and ‘Oma‘o Ranch are existing ranch operations, which require no additional facilities, permits, or improvements. The fluctuation in herd numbers is typical of cattle operations, and poses no impact to the Makoa or ‘Oma‘o ranches, or areas outside the project area.

The Hawai‘i Dairy Farms’ operation will produce calves, as discussed in Chapter 3.0, Section 3.4. Newborn calves will initially be housed at the Māhāʻulepū site and transitioned to pasture at about three to four weeks of age. At approximately 90 days of age (or at 165 pounds), the calves will be transferred to existing working ranches on Kaua‘i and raised offsite. Two ranches on Kaua‘i have initially agreed to take calves from HDF. Makoa Ranch near Kapa’a is an active cattle ranch run by the Farias family. The ranch will raise heifers until ready for return to HDF pasture. Calves to be raised for beef will be incorporated into the Makoa Ranch herd, or sold to other ranching operations. ‘Oma‘o Ranch will care for dry cows during an annual resting period.

Offsite Transportation. Employees working at HDF will create five offsite vehicle trips each day. Transport of cows for herd management will involve one or two truck trips per day between HDF and the offsite ranches. Fluid milk will be trucked offsite once every two days. Sand and feed
delivery would generate three truck trips per week. Fertilizer would be delivered once every other month. Milk transport from Kaua‘i would be once or twice each week via regularly scheduled ocean barges departing from Nawiliwili Harbor. Offsite transportation associated with HDF operations is not anticipated to generate significant secondary effects.

4.20.3 Relationship between Local Short-term Uses of the Environment and the Maintenance and Enhancement of Long-term Productivity

Narrowing of the range of beneficial uses of the environment

The area in which HDF will operate a dairy farm has been used for commercial agricultural for nearly two decades. The dairy farm does not propose a change in land use or a narrowing of the range of beneficial uses of the environment. Instead, it proposes a revitalization of farming on this area designated as Important Agricultural Land and introduction of a sustainable food production. After the end of the lease term – initially 20-years with an additional 10-year option – the land could be used for other purposes. This term could possibly be extended.

Long-term risks to health and safety

Hawai‘i Dairy Farms will not create long-term risk to health and safety. Evaluation of operations and probable impacts to drinking water quality and surface waters demonstrates risks to be minimal. Water quality monitoring will be established to demonstrate no loss of water quality from operations. Pest insects and odors will be minimized by dairy management and is without potential nuisance or health effects to area residents, workers and visitors.

Foreclosure of future options

The dairy farm maintains the existing and reasonable uses of the property for agriculture, and does not foreclose future options.

Trade-offs among short-term and long-term gains and losses

The short-term inconveniences caused by construction activity include increased noise and dust, and increased traffic due to construction vehicles. Once construction is completed, the dairy farm will become a producer of local fresh milk and milk products without the delay and added costs of shipping from the mainland. Along with gains to local food security, the long-term benefits outweigh the relatively short-term losses anticipated during construction.

4.20.4 Irreversible and Irretrievable Commitments of Resources

The construction of the dairy facilities will occupy less than 10 acres, totaling less than 2 percent of the 557-acre site. The site could be modified for other uses in the future. Soil conditions and fertility will be improved through the addition of manure and organic matter, resulting in better growing conditions for future agricultural endeavors.

An irretrievable commitment of private fiscal resources, labor, construction materials and energy will be expended to implement the dairy. There will be a permanent commitment of private funds and resources to plan, design, construct and operate the facilities.

Use of the site for dairy operations does not preclude future conservation use of the wider region, such as examined by the U.S. National Park Service in its 2006 to 2007 reconnaissance study.
4.20.5 Potential for Environmental Accidents

The potential for environmental accidents at the dairy farm has been minimized through exceedance of design requirements and redundancies. The effluent ponds are scaled beyond required capacity. For the extremely remote possibility that the ponds would overflow, a secondary containment system has been designed as an additional safeguard. Risks to surface water quality are minimized with application of best practices including vegetated filter strips and 35-foot setbacks to exclude cows from drainageways. Fuels and chemicals utilized at the dairy facilities will be stored following established protocols and be utilized by qualified applicators in compliance with labeling to safeguard the environment. Secondary containment systems will be utilized in keeping with requirements and best management practices.

4.20.6 Adverse Environmental Effects that Cannot Be Avoided

Implementation of the project will produce unavoidable affects in the short and long-term. Short-term effects are generally associated with construction, and will prevail only for the duration of the construction period. Long-term effects would generally arise after construction. Effects that can be considered both adverse and unavoidable are discussed below.

Unavoidable Adverse Short-Term Effects

- Temporary increases in soil erosion may result from construction, consistent with possible levels after application of best management practices. Small amounts of soil and dust may be carried beyond construction sites in surface runoff water.
- Temporary increases in noise impacts may occur during the construction activities within the HDF site, particularly during excavation activities.
- Temporary impacts to air quality, primarily from fugitive dust emissions, are anticipated during construction activities. Impacts will be within permitted thresholds.
- Short-term traffic impacts from construction activities would be expected to occur as the result of the following types of activities:
  - Increases in truck traffic associated with construction, equipment staging, and delivery of construction materials;
  - Increases in automobile traffic associated with construction workers traveling to and from the dairy farm site.

Unavoidable Adverse Long-Term Effects

- Vegetation will be replaced with non-permeable surfaces where facilities are constructed, totaling 0.1 percent of the site.
- Dairy farm operations will increase potable water consumption for the dairy herd and milking, and non-potable water for pasture irrigation.
- Dairy cows will produce manure and urine in the paddocks to be managed as part of the overall pasture grass nutrient demand, with a small percentage of nutrients passing to surface water and the nearshore marine environment where it will have no impact.
- There will be increased demand on existing utilities and infrastructure. Sustainable design practices and technology will be utilized to reduce demand requirements, including solar power generation.
- There will be an insignificant increase in traffic in the area due to the agricultural industry worker vehicles and local supplier deliveries to and from the dairy.
4.21 DEMOGRAPHIC AND ECONOMIC CONDITIONS (CONTEMPLATED HERD SIZE)

4.21.1 Existing Conditions - Demographic and Economic Conditions

The existing conditions are as described in Section 4.15.

4.21.2 Probable Impacts and Mitigation Measures - Demographic and Economic Conditions

As described in Section 4.15, the production of HDF with an established herd of up to 699 milking cows would increase the supply of local fluid milk by approximately 1.5 million gallons annually. With a herd up to 2,000 milking cows, approximately 4.4 million gallons of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 milking cow herd is estimated at approximately double that of the committed herd size (see Section 4.15). Five additional farm jobs and another 6 indirect jobs would increase the total of direct and indirect full-time equivalent jobs on Kaua‘i to 11, with an additional 3 indirect jobs created on Oʻahu, bringing the total Oʻahu indirect jobs to 6. This would total 22 direct-indirect jobs on Kaua‘i, and 6 indirect jobs on Oʻahu.

At full operations, HDF would generate a net income to the County of $51,000 per year, derived from property taxes on improvements. The State would derive approximately $170,000 annually in revenues, primarily from excise tax on sales for the contemplated herd sizes of 2,000 mature dairy cows.

With a long history of agriculture, most of Kaua‘i has a rural ambiance. Most homes and visitor units on the island are within one mile of some agricultural activity; the rural character adds to the appeal of the island. The review of property values adjacent to beef cattle operations in the region reveals newer homes with large square footage in a luxury residential community with 2016 assessed values of $1,297,150 for a lot, to $2,893,100 for a lot with home. Clearly, beef cattle operations are compatible with nearby homes, commercial areas, resorts and recreational areas. The ranching and rural ambience adds to the value.

4.22 GROUNDWATER RESOURCES (CONTEMPLATED HERD SIZE)

4.22.1 Existing Conditions – Groundwater Resources

The existing conditions are as described in Section 4.16.

4.22.2 Probable Impacts and Mitigation Measures – Groundwater Resources

Impacts that would be considered significant related to groundwater supply and groundwater quality could include:

- Depleting the groundwater supply or interfering with groundwater recharge for aquifers in the project area; and
- Degradation of groundwater quality below State or Federal standards.
Short-term Impacts and Mitigation – Groundwater Resources

Short-term impacts are similar to those described in Section 4.16.3 for the committed herd size. Construction of Hawai‘i Dairy Farms facilities is not anticipated to deplete the groundwater source or interfere with groundwater recharge in the short-term.

Long-term Impacts and Mitigation – Groundwater Resources

Long-term impacts on groundwater resources at the committed herd size as shown in Section 4.16.3 are not significant. For the contemplated herd size of up to 2,000 milking cows, the potable water demand will be approximately 54,800 gpd more than the committed herd size. Water demand would increase by 25 gallons per cow per day, and additional potable water would be needed for milk cooling and sanitation within the milking parlor. An estimated 84,800 gpd would be required for the future contemplated herd size (Table 4.22-1). As with the committed herd size, all potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. The potable water well located on the HDF site provided 3 MGD during the sugarcane plantation era; the demand of approximately 84,800 gallons per day (0.085 MGD) is well within the capacity of Māhā'ulepū 14 well.

<table>
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<tr>
<th>Potable Water</th>
<th>Contemplated Herd Size of up to 2,000 Milking Cows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wash water, milk cooling, employee use</td>
<td>Dairy Facility @2,000 34,800 gpd†</td>
</tr>
<tr>
<td>Livestock water (*25 gpd/cow)</td>
<td>Total Field @2,000 50,000 gpd</td>
</tr>
<tr>
<td></td>
<td>Total Potable Demand 84,800 gpd</td>
</tr>
</tbody>
</table>

†The majority of water used will be captured and re-used to irrigate pasture grass.

The water use rate for a potential future herd size of up to 2,000 milking cows will not significantly impact the aquifer capacity. The potable water demand for the contemplated herd size is relatively modest compared to the 3 MGD capacity of the aquifer deep in the weathered volcanics. The 4,500-foot distance between the HDF Māhā'ulepū 14 well source and the nearest County potable water well (Kōloa Well F), coupled with the modest demand, means that no adverse impacts to ongoing use of groundwater in the volcanics will occur as a result of this use (TNWRE, 2016). Long-term groundwater supply impacts at the future contemplated herd size are not anticipated to be significant.

The groundwater and surface water analysis determined there is no hydrologic connection between the aquifer in the unweathered volcanic series and the shallow groundwater body in the alluvium. Thus nutrients added by the dairy operation will have no impacts to the County drinking water well, the source of potable water within the deep volcanics.

Four water monitoring wells have been installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Results from the monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

4.23 SURFACE WATER RESOURCES & NEARSHORE MARINE ENVIRONMENT (CONTEMPLATED HERD SIZE)

4.23.1 Existing Conditions - Surface Water Resources

The existing conditions are as described in Section 4.17.
4.23.2 Probable Impacts and Mitigation Measures

Impacts that would be considered significant related to surface water could include:

- Cows depositing manure into on-site surface water and damaging the banks of the drainageway causing erosion;
- Introducing sedimentation into the on-site drainage ways; and
- Stormwater run-off carrying manure or nutrients into surface waters.

Probable Impacts and Mitigation – Surface Water Resources & Nearshore Marine Environment

Short-term Impacts and Mitigation – Surface Water Resources & Nearshore Marine Environment (Contemplated Herd Size)

Short-term impacts are similar to those described in Section 4.17.4 for the committed herd size. A Stormwater Pollution Prevention Plan (SWPPP) has been developed for the site to document controls and best management practices to avoid, control, and trap potential erosion associated with construction activities. The SWPPP is required as part of the application for the NPDES – Construction Stormwater General Permit, and describes any discharge in compliance with relevant regulations. Pasture establishment and setbacks of 35-feet from the top of each drainageway will act as filter strips to reduce sediments contributing to surface water turbidity downstream of the dairy site. No short-term adverse effects are anticipated to the quality of nearshore ocean waters and the nearshore marine environment.

Long-term Impacts and Mitigation – Surface Water Resources & Nearshore Marine Environment (Contemplated Herd Size)

Section 4.17 describes how nutrients applied for dairy operations could potentially move to surface waters. The groundwater level of the alluvium is approximately 80 feet above mean sea level near the HDF monitoring wells 1 and 2. This groundwater fluctuates with seasonal high rainfall. In wetter periods, the level rises above the invert elevation of the manmade channels, and a modest amount of discharge from groundwater enters the ditch (TNWRE, 2016). These amounts could possibly be discharged when rainfall exceeds 0.8 inches; according to the 30-year rainfall record, such rainfall has occurred at about three percent of days or about ten day per year on average. These runoff-producing events would be the primary mode of conveyance of nitrogen and phosphorus into surface waters and ultimately to the marine environment. With the estimate of two percent of nitrogen and one percent of phosphorus from HDF operations passing through the pasture turf into shallow groundwater, an estimated 10,000 pounds per year of nitrogen and 900 pounds per year of phosphorus could enter surface water (Appendix E).

Nutrients required to sustain the 470 acres of pasture are the same for the committed and the future contemplated herd size. What changes is the amount supplied as natural fertilizer (manure and effluent) and supplemental chemical fertilizer. The Nutrient Balance Analysis prepared for HDF shows that natural fertilizer from manure deposited directly to pasture and the effluent collected from the milking parlor for the contemplated herd size at 2,000 milking cows will result in an excess of phosphorus from manure and effluent. Nutrient values relevant to the HDF site were used to create the existing mass balance for the site; only through monitoring actual field conditions can the true nutrient balance be known and maintained.
Several management options exist to keep phosphorus and other nutrients in balance. Higher grass yields would demand additional phosphorus. With an increase from the current 16.3 tons of dry matter (DM) per acre per year to a yield of 17.3 tons DM per acre per year, phosphorus demand by the pasture will eliminate any phosphorus overage. Based on research by consultants to HDF, yields of 20 tons DM per acre per year are anticipated following establishment of the committed herd of 699 milking cows and several years of pasture maturation. Should yields not increase as planned, carrying capacity of the site would be 1,875 mature milking cows. With reduced manure, phosphorus levels would require commercial supplementation to maintain the pasture. Nitrogen from commercial fertilizer would be required at both 1,875 and 2,000 milking cows. Adherence to the Conservation Plan and NRCS Nutrient Management Practice Code requires monitoring and analysis of soil, manure, and tissue samples which can be used to amend the nutrient budget prepared for the site.

Setbacks established in adherence to the Conservation Plan and best management practices to reduce impacts to waterways are detailed in Chapter 3, Section 3.5. The setback for effluent application is 50 feet from each side of surface waters. Perimeter fencing to exclude cows from surface waters provides a 35-foot buffer on either side of the drainageways. Vegetative buffers will be maintained within the 35-foot setback from the drainageways.

A long-term water quality monitoring program will be instituted to regularly evaluate surface water quality in the agricultural ditches and Waiopili Ditch, along with nearshore ocean waters. The ongoing monitoring will inform the dairy management team of changes in water quality to gauge whether nutrients and pathogens are reaching a level of environmental concern.

### 4.24 ROADWAYS AND TRAFFIC (CONTEMPLATED HERD SIZE)

#### 4.24.1 Existing Conditions – Roadways and Traffic

The existing conditions are as described in Section 4.18.

The South Kaua‘i Community Plan projects daily vehicle counts along Ala Kinoiki Road at 7,200 trips per day by the year 2035, and 9,500 daily trips on Kōloa Road (COK, 2015a).

#### 4.24.2 Probable Impacts and Mitigation Measures – Roadways and Traffic

Impacts that would be considered significant related to traffic could include:

- A significant increase in traffic on Ala Kinoiki or Poʻipū roads; significant traffic delays for a substantial number of motorists; or
- Changes to traffic patterns or road infrastructure that affects pedestrian, bicyclist or motorist safety.

**Short-term Impacts and Mitigation – Roadways and Traffic (Contemplated Herd Size)**

The anticipated impacts from construction are the same as for the committed herd size, as described in Section 4.18.1. Additional traffic will be generated during construction, but will return to normal levels after project completion during day-to-day operations.

There will be no significant change to traffic patterns or infrastructure related to the public roads.
Traffic operations along Māhāʻulepū Road and associated public roads will continue to operate at acceptable levels of service during peak hours of traffic. The larger potential contemplated herd size would result in a total of 23 vehicles daily, to include employees and delivery vehicles. This is an increase of 11 vehicles daily over the committed herd size.

The South Kauaʻi Community Plan estimates a slight decrease in daily vehicle movements along Ala Kinoiki Road by 2035, from the 2010 level of 8,000 to 7,200 daily vehicles. Daily vehicles along Kōloa Road, however, are expected to increase from 7,200 vehicles per day to 9,500 daily vehicles. An increase of 23 vehicles daily from HDF operations would result in 0.14 percent increase in total vehicle trips in the area. An additional 23 trips daily would have a minimal effect on traffic conditions at County roadways in the area over the long-term.

Construction equipment mobilization will comply with Hawaiʻi Department of Transportation and County requirements. Delivery trucks and milk tanker trucks will be in compliance with State and County size and weight limits; no oversized vehicles will be used for ongoing operations.

<table>
<thead>
<tr>
<th>Traffic Data</th>
<th>*2009-2010 Baseline</th>
<th>w/ 2,000 Herd Dairy</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ala Kinoiki Road</td>
<td>8,000</td>
<td>8,023</td>
<td>0.29%</td>
</tr>
<tr>
<td>Koloa Road</td>
<td>6,500</td>
<td>6,523</td>
<td>0.35%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Traffic Data</th>
<th>*2035 Projection</th>
<th>w/ 2,000 Herd Dairy</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ala Kinoiki Road</td>
<td>7,200</td>
<td>7,223</td>
<td>0.32%</td>
</tr>
<tr>
<td>Koloa Road</td>
<td>9,500</td>
<td>9,523</td>
<td>0.24%</td>
</tr>
</tbody>
</table>

*Source: Fehr & Peers 2014 in County of Kauaʻi 2015b, South Kauaʻi Community Plan

There will be no change to traffic patterns or infrastructure related to the public roads.

4.25 AIR QUALITY, ODOR, AND GREENHOUSE GASES (CONTEMPLATED HERD SIZE)

As described in Section 4.19, the potential odor and emission levels relevant to dairy operations were modeled and estimated for the proposed dairy. The full report, Hawai‘i Dairy Farms Air Emissions and Odor Evaluation Technical Report, is included in Appendix I.

4.25.1 Air Quality (Contemplated Herd Size)

Existing Conditions – Air Quality

The existing conditions are as described in Section 4.19.1.
Probable Impacts and Mitigation Measures - Air Quality

Impacts that would be considered significant related to air quality could include:

- Dust and debris generated during construction of the dairy facilities; and
- On-going dairy operations increasing odor, GHG, and air pollutants in the region.

Short-term Impacts and Mitigation – Air Quality (Contemplated Herd Size)

Short-term impacts from construction are the same as for the committed herd size, described in Section 4.19.1. Exhaust emissions from construction equipment and increased vehicular activity may occur during the construction phase. Fugitive dust emissions are probable during soil excavation, though control measures are required to prevent or minimize fugitive dust emissions from affecting surrounding areas. Due to the remote dairy location, emissions from on-site work will dissipate before reaching public access areas.

Long-term Impacts and Mitigation – Air Quality (Contemplated Herd Size)

Particulate matter in the form of dust will be created by cows when walking along unpaved raceways to the barn area, and, in theory, when walking on dried manure in the paved holding yard. In reality, the paved holding yard is hosed off regularly, and wash water and manure is collected in the effluent ponds for re-application as fertilizer on the pastures. But as explained in Section 4.19.1, the methodology overestimates potential fugitive dust as the model is based on measurements from dry lots (not paved) covered with dry manure where cows are confined.

Impacts are explained in Section 4.19.1 for the committed herd size of 699 milking cows. The following estimate is for a model threshold of 2,000 milking cows based on the dry lot model (Table 4-26.2).

Probable Impacts and Mitigation Measures – Air Quality (Contemplated Herd Size)

Modeling for HDF at both the 699 herd size and the contemplated herd size of up to 2,000 milking cows used a high fugitive dust rate which is considered beyond conditions for HDF but rely on the available published literature (see Section 4.19.1). Only the contemplated herd size of up to 2,000 milking cows was modeled, as at the lower threshold of 699 cows the potential fugitive dust impact would be negligible. The estimated concentration for PM_{10} is 2.01 \mu g/m^3 per 24-hour period, well below the State standard of 150 \mu g/m^3. The estimated concentration for PM_{2.5} is 0.23 \mu g/m^3 per 24-hour period, well below the Federal standard of 35 \mu g/m^3 (Table 4.26-1). Dust control (e.g. watering walkways and washing down the holding yards) will be utilized as needed to keep any particulate matter on site.

Table 4.26-1 Fugitive Dust Analysis

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Average Time</th>
<th>Concentration (ug/m^3)</th>
<th>Background (ug/m^3)</th>
<th>Total Impact ug/m^3</th>
<th>Standards ug/m^3</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM_{10}</td>
<td>24 hr</td>
<td>2.01</td>
<td>39</td>
<td>41.01</td>
<td>150</td>
</tr>
<tr>
<td>PM_{10}</td>
<td>annual</td>
<td>0.33</td>
<td>15</td>
<td>14.83</td>
<td>50</td>
</tr>
<tr>
<td>PM_{2.5}</td>
<td>24 hr</td>
<td>0.23</td>
<td>12</td>
<td>12.23</td>
<td>35</td>
</tr>
<tr>
<td>PM_{2.5}</td>
<td>annual</td>
<td>0.04</td>
<td>3.9</td>
<td>3.94</td>
<td>15</td>
</tr>
</tbody>
</table>
The highest estimated concentrations do not come close to the State standard (Table 4-26.2). Dust control (e.g. watering walkways and washing down the holding yards) will be utilized as needed to keep any particulate matter on site.

The total annual particulate matter emissions were also estimated for PM and greenhouse gases (GHGs). Total annual emissions (in tons per year) are typically estimated for potential permitting applicability. The estimate for a potential future contemplated herd size of up to 2,000 mature dairy cows was 3.3 tons per year. The project will not require any permits under the Clean Air Act, or State of Hawai‘i counterpart.

4.25.2 Odor Assessment (Contemplated Herd Size)

An explanation of the odor assessment methodology can be found in Section 4.19.2.

Existing Conditions - Odor

The existing conditions are as described in Section 4.19.2.

Probable Impacts and Mitigation Measures – Odor (Contemplated Herd Size)

Odor isopleths (a line used to map all points having the same numerical value) were created using the results of AERMOD computer modeling that utilizes four types of input data: emission source information, receptor locations, meteorology, and model specific control options (site and project specific data options). For the contemplated herd size, Figure 4.25-1 displays the results of modelling for the annual extent of the 6.5 OU/m³ odor level. The colored area depicts the 99.5th percentile threshold of 6.5 OU/m³. Within the colored area, odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year.

The odor isopleth shows potential odor beyond the dairy farm boundary does not extend more than 2,780 feet (just over one-half mile), and does not reach recreational or residential areas (Figure 4.25-1).

Short-term Impacts and Mitigation – Odor

The short-term odor extent for the committed herd size is assumed to possibly be detectible by 50 percent of the sensitive population within 1,670 feet past the southern boundary, 44 hours out of every year (see Section 4.19.2). Should HDF decide to expand the herd beyond 699 milking cows, the short-term odor extent may increase correspondingly.

Long-term Impacts and Mitigation – Odor

The odor modeling analysis and isopleths for the larger contemplated herd size is shown in Figure 4.26-3. The odor threshold – defined as the 99.5th percentile of 6.5 OU/m³ odor – is the area in which odors may be detectable by 50 percent of the population at a frequency of once every 200 hours, or roughly 44 hours per year.

The odor isopleth extends beyond the dairy farm boundary approximately 2,780-feet (just over one-half mile), which would not reach recreational or residential areas (Figure 4.25-1). As explained in Section 4.19.2, the parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown (Arcadis, 2015).
Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site (Figure 4.25-1).

![Figure 4.25-1 Odor Detection Limits for 2,000 Herd Size](image)

4.25.3 Greenhouse Gases (Contemplated Herd Size)

See Section 4.19.3 for an overview of Greenhouse Gas (GHG).

Existing Conditions and Methodology – Greenhouse Gases

See Section 4.19.3 for existing conditions and methodology of GHG estimates for HDF. Under the Federal 2010 greenhouse gas reporting rule by the EPA, small businesses and farms are exempted from permitting requirements.
Probable Impacts and Mitigation Measures – Greenhouse Gases (Contemplated Herd Size)

Short-term Impacts and Mitigation – Greenhouse Gases
For the committed herd size, contributions to GHG in the short-term will not be significant. See Section 4.19.3. With establishment of the contemplated herd size, GHG emissions at HDF may reach the estimated 2,693 CO\textsubscript{2}e tons (2,969 US tons) per year as modeled for the committed herd size. This is equivalent to the GHG generated by 170 4-person households annually, including home energy consumption, transportation and waste.

Long-term Impacts and Mitigation – Greenhouse Gases
Potential GHG emissions for HDF at the contemplated herd size of up to 2,000 mature dairy cows was modeled as described in Section 4.19.3 using the IPCC guidelines and conversions. The estimated total of 7,705 CO\textsubscript{2}e metric tons per year (8,493 US tons) was 5,012 CO\textsubscript{2}e metric tons (5,525 tons) more than the committed herd size of 699 milking cows. This would be equivalent to the GHG generated by 485 4-person households, including home energy consumption, transportation and waste (https://www3.epa.gov/carbon-footprint-calculator).

Recent research demonstrates an increased carbon accumulation in soils used for management-intensive grazing practices. Soils with accumulated carbon increase cation exchange and water holding capacity, thus improving soil quality and providing for climate mitigation by sequestering carbon from the atmosphere (Machmuller et al., 2014).

Operational practices to protect air quality by reducing nitrogen emissions will come from guidance in NRCS Conservation Practice Standard 590, Nutrient Management. Application of nutrients will be adjusted through adjustments to the source, timing, amounts, and placement of nutrients. Specific practices to be utilized at HDF include: slow release fertilizers; nutrient enhancement technologies; and stabilized nitrogen fertilizers. Monitoring of soil nutrient levels and manure nutrient levels will be conducted and used to evaluate agronomic needs for the grass and assess potential changes to nutrient uptake.

4.26 SUMMARY OF PROBABLE IMPACTS AND CONTEXTUAL ISSUES (CONTEMPLATED HERD SIZE)
This section discusses the dairy farm’s potential secondary effects and the cumulative impacts on the environment under the contemplated herd size of up to 2,000 milking cows. This summary addresses anticipated potential effects, in addition to effects from the committed dairy herd size.

4.26.1 Interrelationships and Cumulative Environmental Impacts (Contemplated Herd Size)
The contemplated dairy farm would be within the active Māhā’ulepū agricultural area. Other known land uses underway or planned in the region, with the dairy farm in operation, will contribute to the contextual setting of interrelationship and cumulative effects. These known include uses listed in Section 4.20.1, including Agricultural and Commercial Uses and Planned Development in the Kōloa-Po’ipū Region. There are several new agricultural enterprises planned in the vicinity, along with other public and private development and redevelopment efforts in Kōloa Town and Po’ipū area, as referenced under the South Kaua’i Community Plan (COK, 2015a).
Probable Cumulative Impacts (Contemplated Herd Size)

Recognizing the number of development projects planned, the potential impacts of the dairy farm (contemplated herd size) combined with other projects in the region provide insight to probable cumulative impacts. Qualitative or quantitative analyses were conducted in this EIS for pest insects, demographic and economic conditions, groundwater resources, surface water and nearshore marine resources, roadways and traffic, and air quality, odors and greenhouse gases. Of note, nearly all construction activities will have been completed earlier for the establishment of the committed dairy herd.

Pest Insects (Contemplated Herd Size)

There are no native, protected or endangered insect species within the HDF site. For potential manure-related flies, integrated pest management will be utilized to control fly populations around dairy operations, and best practices will be applied to minimize standing manure within the dairy facilities. An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which can bury manure in one to three days and thereby incorporate it into the soil thus interrupting the egg to fly lifecycle which ranges from 7 to 20 days depending on the species. Populations of dung beetles found on Kaua‘i and those species already in Māhāʻulepū Valley, will expand with the growing manure food source, thus increasing and speeding breakdown of manure.

With the establishment of the committed herd size of 699 milking cows, dung beetle populations will have had time to expand. With the natural systems established by the dairy operations, the pest insect populations are not anticipated to increase significantly with the dairy at the contemplated herd size.

Demographic and Economic Conditions (Contemplated Herd Size)

Implementation of the dairy farm at the contemplated herd size will provide approximately 11 direct and indirect full-time equivalent jobs on Kaua‘i, including 10 farm jobs. On O‘ahu, 6 indirect jobs would be created at the contemplated herd of up to 2,000 milking cows. The economic impacts are summarized in Section 4.21, and the complete study is provided in Appendix J. The increase in agricultural employment will add to local economic activity, generating $170,000 in net revenues annually to the State, and net income to the County of $51,000 per year. The dairy farm at the contemplated herd size will add more agricultural industry employment, provide greater net revenues to the County and State, and bring additional fresh milk and milk products to advance local food sustainability.

With a long history of agriculture, most of Kaua‘i has a rural ambiance. Most homes and visitor units on the island are within one mile of some agricultural activity; the rural character adds to the appeal of the island. The review of property values adjacent to beef cattle operations in the region reveals newer homes with large square footage in a luxury residential community with 2016 assessed values of $1,297,150 for a lot, to $2,893,100 for a lot with home. Clearly, beef cattle operations are compatible with nearby homes, commercial areas, resorts and recreational areas. The ranching and rural ambience adds to the value.
Groundwater Resources (Contemplated Herd Size)

**Demand - HDF:**
With an increase in cows for the contemplated potential future herd size, another 25 gpd per animal for drinking water is required, as well as additional wash water of 17.4 gpd per animal. This would increase demand for potable water to 84,800 gpd for up to 2,000 milking cows, or 54,800 gpd over the committed herd size. The existing, on-site agricultural well had an estimated yield of 3 MGD during the sugarcane plantation era; the increased demand of 84,800 gallons (0.85 million gallons) is well within the aquifer yield.

Nearly all of the potable water used will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Potable water used in the milking parlor and dairy facilities will be captured and recycled with nutrients as irrigation water. Some percentage of the livestock drinking water is returned as effluent and ultimately utilized by the pasture grass. The potable water use rate for the potential contemplated herd size of up to 2,000 milking cows, and the lack of connection plus the 4,500 foot distance between the on-site well and the nearest County potable water well (Kōloa Well F) will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer.

**Demand - Kōloa-Poʻipū:**
Per Section 4.20.1, the adjacent developed Kōloa-Poʻipū region shows large and growing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase from the year 2010 population of 67,100 residents to 84,400 in 2030, a change of 17,300 residents over the 20-year period. The South Kaua‘i population is estimated to reach 16,855 in 2035. Compared to the remainder of the island, population growth for this region is projected to increase to encompass 19.2 percent of the County population; in 2010 the region contained roughly 17.4 percent of the County population (COK, 2015a).

Water use reported from the Kōloa aquifer in 2004 was approximately 2.3 MGD, approximately 8 percent of the estimated 30 MGD sustainable yield for the aquifer (CWRM, 2008). For the South Kaua‘i region (the Kōloa - Poʻipū - Kalaheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day (SSFM, unpublished). An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water (SSFM, unpublished). Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

With the contemplated herd size of up to 2,000 mature dairy cows, conservative calculations of potential nitrogen and phosphorus inputs to groundwater from HDF operations are the same as for the committed herd size. The addition of these nutrient levels will represent a fraction of the nutrient inputs from the Koloa-Poipu region.

Nitrogen input to the marine environment from resort landscaping and golf course fertilization, and domestic wastewater, in the Poʻipū region is 38,510 pounds of nitrogen annually. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually. This is 3.8 times greater than the estimate from dairy operations. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. Significantly different soils mean that nutrient inputs from the Poʻipū region are constant throughout the year, and no mitigation is applied to reduce the quantities.
Surface Water and Nearshore Marine Resources (Contemplated Herd Size)

With an on-site manager for the new agricultural endeavor utilizing best management practices to protect water quality through nutrient and soil management, current run-off would be reduced. Under the contemplated herd size of up to 2,000 milking cows, the NRCS-reviewed Conservation Plan will minimize sediment, nutrient and pathogen inputs to the surface waters in these drainages.

At contemplated herd size, HDF will continue to balance nutrient needs of pasture grass as well as improve the water-holding capacity of soils. Working closely with DOH and NRCS, dairy farm staff are helping to improve understanding of factors that affect local water quality. Adherence to strict measures to protect water quality through proper irrigation management practices and re-analysis of nutrient inputs and outtake, the dairy farm will balance nutrient needs of pasture grass as well as improve the water-holding capacity of soils. Occasional nutrient run-off may allow some diluted nutrients to bypass mitigation measures to be employed, but will have no significant deleterious effect on the area's surface water quality. Nearshore water quality at the Waiopili Ditch outlet and along this coastline will not be significantly degraded by inputs from HDF.

Roadways and Traffic (Contemplated Herd Size)

The development of the dairy farm facilities and future operations is not expected to have a significant impact on traffic operations in the area roadways. The projected increase in vehicle movements related to HDF operations for the future contemplated herd size of 2,000 milking cows is approximately 23 additional vehicle trips per day. Projected daily vehicle counts for the year 2030 on Ala Kinoiki Road are 7,200 trips per day, with an additional 9,500 daily trips projected for Kōloa Road, totaling 16,700 vehicle trips in the vicinity. An increase of 23 vehicles daily from HDF operations would result in 0.14 percent increase in total vehicle trips in the area. HDF will contribute no significant impacts to traffic conditions on County roadways.

Air Quality/Odors/Greenhouse Gases (Contemplated Herd Size)

Results from the air quality odor model indicate that any long-term impacts on air quality in the project area due to contemplated dairy farm operations would be negligible. Under the worst-case meteorological conditions, concentrations of odor are limited to within 2,780-feet of the dairy farm boundary and do not reach residential or resort areas. With active management of the dairy operations, there will be no noticeable odors or reduction of air quality in the surrounding area. The limited number of worker vehicles and trucks will create nominal increase in air emissions, not significantly contributing to the air emissions generated by vehicles in the region. Contributions to greenhouse gas will not be significant.

4.26.2 Potential Secondary Effects (Contemplated Herd Size)

Local Milk Production and Food Sustainability. At the contemplated herd size of up to 2,000 milking cows, Hawai’i Dairy Farms will produce substantial secondary effects in terms of local milk production, local milk products production and increased food sustainability. When the dairy matures to full capacity with a contemplated herd size of 2,000 milking cows, it will produce approximately 4.4 million gallons of fresh, local milk each year for the residents of Hawai’i. This equates to over 25 million pounds of milk, which exceeds the level for food sustainability for the island of Kaua‘i (see Section 4.21, Demographic and Economic Conditions). The 3.0 million gallons of locally produced milk will reduce Hawai’i’s 90 percent dependence on milk shipments from the
US mainland. Potential future processing of fluid milk into soft cheeses and yogurt could provide value-added products for HDF or procurers of the fluid milk.

**Indirect Employment.** For the estimated development period of the dairy, indirect employment will be generated and is expected to average 44 jobs on Kaua‘i and an additional 13 jobs on O‘ahu. For on-going dairy operations with the contemplated herd size, it is estimated that about 15 additional indirect jobs will be created on Kaua‘i and another 8 indirect jobs created on O‘ahu, in addition to the direct HDF jobs.

**Source of Calves for the Local Ranching Industry.** Over the long-term, dairy operations will provide a source of calves for the local ranching industry and expand the market for ranch-related additional goods and services from local vendors. This source of calves will increase with the contemplated herd size.

**Offsite Herd Management.** The contemplated herd size of up to 2,000 milking cows at the Māhā‘ulepū site relates to a permitting threshold that references the count of mature milking cows. As discussed in Chapter 3.0 and Section 4.20.2, animals in various stages of lactation and rest will be transferred between HDF and existing Kaua‘i ranches as needed for animal health and dairy productivity. Makoa Ranch and ‘Oma‘o Ranch on Kaua‘i are existing ranch operations, which require no additional facilities, permits, or improvements to have fluctuation in herd numbers, which is typical of cattle operations. No impact to the Makoa or ‘Oma‘o ranches, or areas outside the project area, will occur as a result of the offsite herd management.

With the contemplated herd size of up to 2,000 milking cows at the Māhā‘ulepū site, more animals will be transferred between HDF and existing Kaua‘i ranches.

**Offsite Transportation.** With the contemplated herd size of up to 2,000 milking cows, employees working at HDF will generate an estimated 10 offsite vehicle trips each day. Transport of cows for herd management will involve two truck trips per day between HDF and the offsite ranches. Fluid milk will be delivered to the milk processing site twice each day. Sand and feed delivery would generate four to five truck trips per week. Fertilizer would be delivered once every other month. Milk transport from Kaua‘i would be twice each week via regularly scheduled ocean barges departing from Nawiliwili Harbor. Offsite transportation associated with HDF operations is not anticipated to generate significant secondary effects.

**4.26.3 Relationship between Local Short-term Uses of the Environment and the Maintenance and Enhancement of Long-term Productivity (Contemplated Herd Size)**

**Narrowing of the range of beneficial uses of the environment (Contemplated Herd Size)**

The area in which HDF will operate a dairy farm has been used for commercial agricultural for nearly two decades. The dairy farm does not propose a change in land use or a narrowing of the range of beneficial uses of the environment. Instead, it proposes a revitalization of farming on this area designated as Important Agricultural Land and introduction of a sustainable food production. After the end of the lease term – initially 20-years with an additional 10-year option – the land could be used for other purposes. This term could possibly be extended. Further, additions of organic matter from manure will improve soil tilth - the physical condition of the soil - over the long-term.
**Long-term risks to health and safety (Contemplated Herd Size)**

Hawaiʻi Dairy Farms at the contemplated herd size is not anticipated to create long-term risk to health and safety. The groundwater and surface water analysis confirmed no connection between groundwater in the alluvium on the valley floor and the deeper aquifer within unweathered volcanic series containing the County drinking water source. Regardless, HDF has installed monitoring wells to assess any increased nutrients within the waterbodies in the alluvium. Measures are to be taken to protect drinking water quality and surface waters. Pest insect populations will be managed through an integrated pest management system focused on the natural food web of invertebrates to disrupt breeding. Under worse-case meteorological conditions, odors may be detected by 50 percent of people just 44 hours of each year, however, the worst-case range is within one-half mile of the site and would not reach recreational or residential areas.

**Foreclosure of future options (Contemplated Herd Size)**

The dairy farm at the contemplated herd size maintains the existing and reasonable uses of the property for agriculture, and does not foreclose future options.

**Trade-offs among short-term and long-term gains and losses (Contemplated Herd Size)**

Although construction activities will have largely been completed earlier for the establishment of the committed dairy herd, there will be short-term inconveniences caused by construction activity at the contemplated herd size. This will include some incremental increase in noise and dust, and increase in traffic due to construction vehicles. Once construction is completed, the dairy farm at the contemplated herd size will become an even larger producer of local fresh milk and milk products without the delay and added costs of shipping from the mainland. Along with gains to local food security, the long-term benefits outweigh the relatively short-term losses anticipated during construction.

**4.26.4 Irreversible and Irretrievable Commitments of Resources (Contemplated Herd Size)**

The construction of the dairy facilities will occupy less than 10 acres, totaling less than 2 percent of the 557-acre site. The site could be modified for other uses in the future. Soil conditions and fertility will be improved through the addition of manure as organic matter, resulting in better growing conditions for future agricultural endeavors.

Use of the site for dairy operations does not preclude future conservation use of the wider region, such as examined by the U.S. National Park Service in its 2006 to 2007 reconnaissance study.

**4.26.5 Potential for Environmental Accidents (Contemplated Herd Size)**

At the contemplated herd size, the potential for environmental accidents at the dairy farm will remain minimal. Standards and regulatory requirements must be met; reviews and approvals are required from the State Department of Health for the waste management facilities. Capacity beyond that required has been built into the design and scaling of the effluent ponds. For the extremely remote possibility that the ponds would overflow, a secondary containment system has been designed as an additional safeguard. Risks to surface water quality are minimized with application of best practices including vegetated filter strips and 35-foot setbacks to exclude cows from drainage ways. Fuels and chemicals utilized at the dairy facilities will be stored following established regulations and applied by qualified applicators in compliance with labeling to safeguard the environment.
4.26.6 Adverse Environmental Effects that Cannot be Avoided (Contemplated Herd Size)

Implementation of the dairy farm at the contemplated herd size will produce unavoidable affects in the short term and long term. Short-term effects are generally associated with construction, and will prevail only for the duration of the construction period, mostly completed under the committed herd size. Long-term effects would generally arise after construction. Effects that can be considered both adverse and unavoidable at the contemplated herd size are discussed below.

Unavoidable Adverse Short-Term Effects (Contemplated Herd Size)

- Existing ground cover vegetation and landscaping will be displaced by built facilities, covering approximately 2 percent of the site, will be completed at the committed dairy herd level.
- Temporary increases in soil erosion may result from dairy establishment as noted in Section 4.20.6 limited to the construction period.
- Potential short-term air quality impacts, primarily from fugitive dust emissions related to construction, are noted in Section 4.20.6 limited to the construction period.
- Short-term traffic impacts from construction activities, largely completed for the committed dairy herd, would be expected to occur as the result of the following types of activities:
  - Increases in truck traffic associated with removal and redistribution of excavation fill materials and delivery of construction materials.
  - Increases in automobile traffic associated with construction workers traveling to and from the dairy farm site.

Unavoidable Adverse Long-Term Effects (Contemplated Herd Size)

- Dairy farm operations will increase potable water consumption for the dairy herd and milking, and non-potable water for pasture irrigation.
- Dairy cows will produce manure and urine in the pasture paddocks in the contemplated herd size dairy farm operations. This will continue to be managed as part of the overall pasture grass nutrient demand, with a small percentage of nutrients passing to surface water and shallow groundwater.
- There will be increased demand on existing utilities and infrastructure in the contemplated herd size dairy farm operations. Sustainable design practices and technology will be utilized to reduce demand requirements, including solar power generation.
- There will be an insignificant increase in traffic in the area in the contemplated herd size dairy farm operations, due to the agricultural industry worker vehicles and local supplier deliveries to and from the dairy.

4.27 SUMMARY OF PROBABLE IMPACTS FOR BOTH HERD SIZES

Table 4.27-1 summarizes the impacts described in this chapter.
### Table 4.27-1 Summary of Impacts from the Committed and Contemplated Herd Size

<table>
<thead>
<tr>
<th>SUMMARY OF PROBABLE IMPACTS</th>
<th>Proposed Action - Committed Herd Size: 699 milking cows</th>
<th>Proposed Action - Contemplated Herd Size: 2,000 milking cows</th>
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</thead>
<tbody>
<tr>
<td><strong>CLIMATE</strong></td>
<td>The scale of HDF is not large enough to influence global climate cycles related to solar radiation or evapotranspiration. No significant impacts are anticipated, and no mitigation would be required.</td>
<td>No change.</td>
</tr>
<tr>
<td><strong>TOPOGRAPHY</strong></td>
<td>The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the site. Within the pasture area, swales previously installed for agriculture and low-lying areas may be smoothed or filled to improve surface drainage and uniformity for grazing. Existing farm road will be slightly elevated, with cow raceways constructed in parallel above grade; swales will be created to direct run-off where needed.</td>
<td>No change.</td>
</tr>
<tr>
<td><strong>SOILS</strong></td>
<td>Short-term soil disturbance for construction of roadways and dairy facilities will be minimized through the adherence to the Conservation Plan, best management practices, and controls per an NPDES Construction Stormwater General Permit. Soil loss is expected to be within permitted thresholds and to not be significant Long-term soil impacts are anticipated to result in improvements to the physical, chemical, and biological condition of the soil.</td>
<td>Increased benefit to soil conditions long-term.</td>
</tr>
<tr>
<td><strong>LAND USE &amp; AGRICULTURAL SETTING</strong></td>
<td>The development of Hawai’i Dairy Farms will be in full compliance with its agricultural State Land Use District designation and embodies the IAL designation per the Hawai’i State Constitution by using the protected lands in the project area for their intended purpose of diversified agriculture and agricultural self-sufficiency. No request for change of land use will be made, and no mitigation is needed.</td>
<td>No change.</td>
</tr>
<tr>
<td><strong>VISUAL &amp; AESTHETIC RESOURCES</strong></td>
<td>No public scenic views or lookouts will be affected by dairy development or operations. There will be no adverse effect to public views of the Pu’u Huluhulu crater, views from the Ala Kinoiki Road corridor, or impediment to views of the Hā’upu Mountains from the HDF site.</td>
<td>No change.</td>
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<tr>
<td>NATURAL HAZARDS</td>
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<td>Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Design incorporates wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation recommended Seismic Site Class D under IBC standards for the area where the barns and agricultural infrastructure will be constructed. A natural disaster plan has been prepared by the Hawai‘i Dairy Farms’ manager to address hurricane, fire, and potential flooding hazard scenarios. HDF is not in a flood zone or tsunami inundation area, so this scenario is mentioned in the disaster plan only for HDF personnel to maintain awareness. The disaster response plan outlines safety procedures during the event, follow up actions, and emergency contacts for assistance before, during or following the event.</td>
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<tr>
<th>ARCHAEOLOGICAL &amp; HISTORIC RESOURCES</th>
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<tr>
<td>The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will contain dairy activities and related impacts within the project area. Ten post-European contact era sites associated with Plantation-era sugarcane cultivation were identified on site. No further work regarding these sites is recommended. Dairy operations will adapt some sites for utilization, such as bridges and culverts. In the unlikely event that resources are discovered during construction, appropriate procedures will be followed as required in applicable HRS regulations. In an extended survey area up to 1,000 meters outside the HDF northern boundary, two sites were identified that are considered significant under multiple criteria occur. Neither site, both of which are outside the project area, will be adversely affected by the proposed dairy project.</td>
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<tr>
<th>CULTURAL PRACTICES &amp; RESOURCES</th>
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<tr>
<td>Information received from the community indicates the Māhā‘ulepū ahupua‘a has been, and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be adversely impacted by establishment of the dairy.</td>
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<tr>
<th>FLORA &amp; FAUNA</th>
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<tr>
<td>No threatened or endangered plants occur on the project property, and no intact native plant habitat exists within or surrounding the site. No critical habitat for endangered flora or fauna species is defined in or immediately surrounding the site; no impacts are anticipated from the dairy. Native plants with potential to stabilize banks will be encouraged and supplemented if needed to enhance the planned buffer strips along drainages.</td>
<td>No change.</td>
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<tr>
<td>Potential use of paddocks by native, endangered waterbirds may occur. In keeping with best practices related to protected species, any outside lighting at night will be shielded to prevent attraction to overflying seabirds. There are almost no suitable roost trees within the dairy site; therefore, no effect to bats is expected from the dairy farm. HDF will develop an Avian Species Protection Plan and train employees to detect endangered waterbirds and nēnē and prevent harmful impacts from dairy operations.</td>
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<tr>
<th>INVERTEBRATE SPECIES &amp; PEST INSECTS</th>
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<tr>
<td>There are no native, protected or endangered insect species within the HDF site. Construction of the dairy facilities will not impact any native or endangered invertebrate populations. Integrated pest management will be used disrupt the fly lifecycle and minimize populations of manure-related flies. Use of mechanical insect controls, including traps (outdoors) in paddocks where cows are excluded, and sticky tapes (indoors) will be used as needed for both monitoring and removal of flies. Water troughs will incorporate “ramps” for honey bee to protect bees that come to water.</td>
<td>No change.</td>
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<tr>
<th>NOISE</th>
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<tr>
<td>Construction work at the project site will involve activities that may generate an increase in noise levels. Noise related to construction will be a short-term condition, occurring during daylight hours. Milking equipment will be contained in the milking parlor structure, and field equipment such as tractors will typically be used during daylight hours. Dairy operations will generate noise in keeping with agricultural zoning of the parcel. Noise from the dairy will not exceed the DOH threshold, and will not contribute to excessive noise in the region.</td>
<td>No change.</td>
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<tr>
<th>HAZARDOUS SUBSTANCES</th>
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<tr>
<td>Pesticides, herbicides, fuels and lubricants will be stored according to regulations and utilize secondary containment per best practices and requirements. No significant long-term impacts will occur from hazardous substances related to dairy operations, due to minimization of risk, secondary con-</td>
<td>No change.</td>
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A review of historic aerial photos and topographic maps show there were no pesticide mixing or storage operations on the HDF site.

**PUBLIC SERVICES**

Dairy facilities and dairy operations are not anticipated to place a significant demand on fire protection, police, or medical services. The dairy will help to support these services through contributions to County real property tax.

**DEMOGRAPHIC & ECONOMICS**

The dairy will create construction jobs and 36 direct and indirect full-time jobs during construction. Construction will provide revenues to businesses on both Kaua‘i and O‘ahu. The dairy will generate substantial positive State and County revenues. In-state milk production will expand agricultural revenues and jobs in Hawai‘i.

Approximately 11 direct and indirect full-time equivalent jobs would be sustained on Kaua‘i, including 5 farm jobs and about 6 indirect jobs. An additional 3 indirect jobs would be created on O‘ahu.

Annual direct-plus-indirect sales are estimated annually at $8.1 million on Kaua‘i, with an additional $2 million on O‘ahu.

Net income to the State is calculated to exceed $60,000 annually. Net income to the County from HDF is anticipated to generate $51,000.

With the contemplated herd size, milk production would be 4.4 million gallons annually at steady-state. This would double current local milk production of operational dairies in Hawai‘i.

Employment for ongoing operations at the contemplated herd size would be double that of the committed herd size: total 22 direct-indirect jobs on Kaua‘i, and 6 indirect jobs on O‘ahu.

Net income to the County of $51,000 per year, derived from property taxes on improvements. The State would derive approximately $170,000 annually in revenues, primarily from excise tax on sales.

The review of property values adjacent to beef cattle operations in the region reveals newer homes with large square footage in a luxury residential community with 2016 assessed values of $1,297,150 for a lot, to $2,893,100 for a lot with home. Clearly, beef cattle operations are compatible with nearby homes, commercial areas, resorts and recreational areas. The ranching and rural ambience adds to the value.

**GROUNDWATER RESOURCES**

Construction of Hawai‘i Dairy Farms facilities is not anticipated to deplete the groundwater source or interfere with groundwater recharge.

Short-term water supply demand during the construction period is anticipated to be nominal. The major water demand during construction will be for fugitive dust control. Water will come from a non-municipal source: either the on-site deep wells; or from the HDF allocation of water from Waita Reservoir.

The dairy will utilize 30,000 gallons per day of groundwater from on-site wells for potable uses: livestock water; and sanitation in the milking parlor. The demand of approximately 30,000 gallons per day (0.03 MGD) for potable water is well within the capacity of the existing

An additional 54,800 gallons per day of potable water will be used for the contemplated herd size, for a total of 84,800 gallons per day.

Setbacks are the same for both herd sizes.
Māhāʻulepū 14 well which produced 3 MGD during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle.

The groundwater and surface water assessment determined there is no hydrologic connection between the aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Thus nutrients added by the dairy operation will have no impacts to the County drinking water well and potable water within the deep volcanics, the source of potable water. Further, the assessment concluded that the modest potable water use rate for dairy operations, and the 4,500-foot distance between the onsite potable water well and the nearest County potable water well (Kōloa Well F), mean that no adverse impacts to ongoing use of groundwater in the unweathered volcanics will occur as a result of this use.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow waterbodies in the Māhāʻulepū Valley alluvial material, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing.

### SURFACE WATER RESOURCES

Controls and best management practices to avoid, control, and trap potential erosion associated with construction activities will be implemented. Any stormwater discharge associated with construction in the short-term will be in compliance with relevant regulations. Over the long-term, adherence to the Conservation Plan and best management practices establishes setbacks to minimize impacts to waterways. The setback for effluent application is 50 feet from each side of surface waters. Perimeter fencing to exclude cows from surface waters provides a 35-foot buffer on either side of the drainageways. Vegetative buffers will be maintained within the 35-foot setback from the drainageways.

The natural fertilizer from manure deposited directly to pasture and the effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop. Supplemental commercial fertilizer will be required to provide sufficient nutrients to sustain the pasture grass at the committed herd size.

Episodic, seasonal rainfall events cause groundwater in the alluvium to rise and intersect with the deep agricultural ditches in the vicinity of HDF monitoring wells 1 and 2. Such episodes are calculated to average 10 days annually. Setbacks and NRCS standard practices remain the same between the committed and contemplated herd sizes.

Nutrients required to sustain the 470 acres of pasture are the same for the committed and the future contemplated herd size. What changes is the amount supplied as natural fertilizer (manure and effluent) and supplemental chemical fertilizer. The Nutrient Balance Analysis prepared for HDF shows that natural fertilizer from manure deposited directly to pasture and the effluent collected from the milking parlor for the contemplated herd size at 2,000 milking cows will result in an excess of phosphorus from manure and effluent with current grass yields of 16.3 tons of dry matter per acre. Nutrient values relevant to the HDF site were used to create the existing mass balance for the site; only through monitoring actual field conditions can the true nutrient balance be known and maintained.

Several management options exist to keep phosphorus and other nutrients in balance. A herd of 1,875 mature milking cows would provide less ma-
ally, which would result in a modest amount of groundwater containing nutrients to discharge into the surface ditches. The amount of nutrients estimated from HDF operations released to surface water is calculated at 10,000 pounds of nitrogen and 900 pounds of phosphorus annually.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore.

There are over 120 wastewater treatment injection wells serving resort development in Po’ipū. Nitrogen input to the marine environment in the Po’ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po’ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

State DOH surveys and environmental sampling/testing programs have identified high levels of enterococci bacteria in the agricultural ditches, particularly near the terminus of the ditch near the ocean. State standards apply to recreational waters, and the ditch is not utilized recreationally by bathers.

Over the long-term, the surface water quality in the agricultural ditches and Waiopili Ditch will be improved by active management of the dairy site. The dairy site represents roughly 20 percent of the 2,700-acre Māhā‘ulepū Valley sub-watershed, and soil erosion from the HDF site will be reduced by establishment of thick grass ground cover and maintenance of vegetative buffers totaling 70 feet in width – 35 feet on either side of the agricultural drainageways.

### ROADWAYS & TRAFFIC

<table>
<thead>
<tr>
<th>Short-term construction traffic will occur during the development of the dairy facilities. For the long-term, worker vehicles and delivery and supply trucks will access the dairy on a weekly basis. The number of vehicles associated with the dairy at the committed herd size will increase by approximately 12 vehicles per day, and will not represent a significant amount of the total traffic on local roadways. Traffic conditions on roadways in Po‘ipū and Kōloa will not deteriorate as a result of the dairy operations.</th>
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<tr>
<td>Traffic operations along Māhā‘ulepū Road and associated public roads will continue to operate at acceptable levels of service during peak hours of traffic. The larger potential contemplated herd size would result in a total of 23 vehicles daily, to include employees and delivery vehicles. This is an increase of 11 vehicles daily over the committed herd size. Based on known and planned developments for the South Kaua‘i region, estimated travel on Ala Kinoiki Road for the year 2035 is anticipated to be 7,200 vehicles daily. For the same year, daily vehicle travel on</td>
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</table>

Adherence to the Conservation Plan and NRCS Nutrient Management Practice Code requires monitoring and analysis of soil, manure, and tissue samples which can be used to amend the nutrient budget prepared for the site.

A long-term water quality monitoring program will be instituted to regularly evaluate surface water quality in the agricultural ditches and Waiopili Ditch, along with nearshore ocean waters. The ongoing monitoring will inform the dairy management team of changes in water quality to gauge whether nutrients and pathogens are reaching a level of environmental concern.
Koloa Road is anticipated to be 9,500. An increase of 23 vehicles daily from HDF operations would result in 0.14 percent increase in total vehicle trips in the area. This is less than one percent, and will not have a significant impact on traffic in the area.

<table>
<thead>
<tr>
<th>AIR QUALITY, ODOR &amp; GREENHOUSE GASES</th>
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<tr>
<td>Construction effects on air quality including dust and construction vehicle emissions will be temporary and reduced by best management practices and short-term mitigation measures.</td>
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<tr>
<td>Odor conditions at the pasture-based dairy will be limited within the dairy project area and immediate vicinity. In the worst-case meteorological conditions, odor may reach approximately 1,670 feet south of the HDF southern boundary. The odors will not reach resort or residential communities. For the area within the modeled odor isopleth, odor may be detectable by 50 percent of the population at a frequency of once every 200 hours, or roughly 44 hours per year.</td>
</tr>
<tr>
<td>No air quality impacts are anticipated during construction as a result of either herd size. For the contemplated herd size, odor may reach approximately 2,780 feet south of the HDF southern boundary in the worst-case meteorological conditions. The odors will not reach resort or residential communities. For the area within the modeled odor isopleth, odor may be detectable by 50 percent of the population at a frequency of once every 200 hours, or roughly 44 hours per year. Greenhouse gas emissions will not be significant, and in fact may be negated by the ability of soils to sequester carbon from the atmosphere and improve soil structure and function.</td>
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<tr>
<th>CUMULATIVE IMPACTS</th>
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<tbody>
<tr>
<td>The development and operation of the pasture-based dairy may be combined with impacts associated with anticipated future developments in the Po'ipu and Koloa region. With mitigation, there may be limited short-term impacts such as soil erosion, dust, and vehicle emissions. Long-term cumulative effects may include limited soil erosion, storm water runoff, groundwater use, nutrient contributions to agricultural ditches, worker vehicle traffic, and air emissions. Odors will be contained within the dairy and adjacent farms. In addition to injected wastewater nutrients entering the nearshore ocean waters generated by the Po'ipu resorts and residential areas, there will be minor amounts of nutrients contributed from the pasture-based dairy. The dairy will provide net economic benefits, adding to the agricultural economy of Kaua'i.</td>
</tr>
<tr>
<td>Quantification of probable impacts from the contemplated herd size are shown in the specific resource section. Otherwise, cumulative impacts from both the committed herd size and contemplated herd size are not significant.</td>
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4.28 UNRESOLVED ISSUES

Resolution of Milk Products Processing by HDF

The scope of milk processing operations has yet to be resolved. The location for the milk processing activity has not been finalized. The opportunity to undertake value-added processing steps in milk products processing could be conducted on-island. Completion of milk products processing on-island would create additional employment and government revenues for Kaua‘i, increase the availability of local milk products, and further bolster the local agricultural economy. If milk products processing is not undertaken on Kaua‘i, the milk would be shipped in bulk to one of the existing processing facilities on O‘ahu or Hawai‘i Island for further process steps, packaging and marketing.

Resolution of the Final Dairy Farm Herd Size

Successful dairy farming involves the mastery of numerous elements, such as soil science, agronomy and animal husbandry. The final scaling of the milking cow herd size for the Hawaii Dairy Farm operations will ultimately be determined based on the results of pasture grass development at the Māhā‘ulepū site, and dairy cow milk production levels. Up to the committed herd size, this will be an iterative process of monitoring and testing to determine the best approaches to optimize dairy operations and foster good health in the natural systems. It is anticipated that the HDF dairy herd can be increased well beyond 1,000 to 1,500 milking cows and be sustainable from an operational and environmental perspective. With careful monitoring of the operations and the natural systems, including the soils, pasture grasses and water quality, the dairy scaling can be accomplished with sensitivity to the various indicators of carrying capacity. The potential for HDF to reach the upper scale of 2,000 milking cows at the dairy may or may not ultimately occur, depending upon the operational sensitivities and the indicators shown by the carefully monitored natural systems.
5.0

PLANS AND POLICIES
5.0 CONSISTENCY WITH GOVERNMENT PLANS AND POLICIES

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal</td>
<td>5-2</td>
</tr>
<tr>
<td>5.1 Coastal Zone Management Act (CZMA)</td>
<td>5-2</td>
</tr>
<tr>
<td>State of Hawai‘i</td>
<td>5-3</td>
</tr>
<tr>
<td>5.2 Hawai‘i State Constitution</td>
<td>5-3</td>
</tr>
<tr>
<td>5.3 Hawai‘i State Plan</td>
<td>5-4</td>
</tr>
<tr>
<td>5.4 Hawai‘i State Functional Plans</td>
<td>5-23</td>
</tr>
<tr>
<td>5.5 Hawai‘i 2050 Sustainability Plan</td>
<td>5-24</td>
</tr>
<tr>
<td>5.6 Hawai‘i State Land Use District Boundaries</td>
<td>5-27</td>
</tr>
<tr>
<td>5.7 State of Hawai‘i Department of Agriculture</td>
<td>5-28</td>
</tr>
<tr>
<td>5.8 State of Hawai‘i Water Policies</td>
<td>5-28</td>
</tr>
<tr>
<td>5.9 Hawai‘i Coastal Zone Management Program</td>
<td>5-30</td>
</tr>
<tr>
<td>County of Kaua‘i</td>
<td>5-32</td>
</tr>
<tr>
<td>5.10 County of Kaua‘i General Plan</td>
<td>5-32</td>
</tr>
<tr>
<td>5.11 County of Kaua‘i Comprehensive Zoning Ordinance</td>
<td>5-42</td>
</tr>
<tr>
<td>5.12 County of Kaua‘i – Special Management Area</td>
<td>5-43</td>
</tr>
<tr>
<td>5.13 County of Kaua‘i – South Kaua‘i Community Plan</td>
<td>5-45</td>
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This section addresses the Hawai‘i Dairy Farms consistency with applicable policies and plans set forth in the relevant Federal acts, laws and plans of the State of Hawai‘i, and the plans and ordinances of the County of Kaua‘i. The discussion presents the Proposed Project’s consistency with the Hawai‘i State Plan, Hawai‘i Functional Plans, Hawai‘i 2050 Sustainability Plan, State of Hawai‘i Water Policies, Hawai‘i Land Use Districts, and Hawai‘i Coastal Zone Management Act. This section also addresses the Proposed Project's consistency with County of Kaua‘i plans and policies, including the County General Plan, South Kaua‘i Community Plan, and Comprehensive Zoning Ordinance.
FEDERAL

This section assesses the relationship of the project with primary and applicable Federal regulatory controls, which includes the Coastal Zone Management Act (CZMA).

5.1 COASTAL ZONE MANAGEMENT ACT

In 1972, the Federal government enacted the CZMA to effectively manage, use, protect, and develop coastal areas in the U.S. The CZMA was a government response to increasing and competing demands upon habitats and resources of coastal lands and waters. Such demands often resulted in a loss of living marine resources and wildlife; depleted nutrient-rich areas; shoreline erosion; diminished open space for public use; and permanent and adverse changes to ecological systems. Under the CZMA, States are authorized to work in a unified manner with Federal and local governments to develop programs, policies, evaluation criteria, development standards that lend to the effective protection and prudent use of coastal lands and waters. The enforcement authority for the Federal Coastal Management Program (Public Law 104-150, as amended in 1996) has been delegated to the State of Hawai‘i under Hawai‘i Revised Statutes (HRS) Chapter 205A, Coastal Zone Management (CZM) Program.

In 1990, congress enacted the Coastal Zone Act Reauthorization Amendments (CZARA) by adding a new Section 6217 “Protecting Coastal Waters,” which requires that each State with an approved coastal zone management program must develop a Coastal Nonpoint Pollution Control Program (CNPCP) to U.S. Environmental Protection Agency (EPA) and National Oceanic and Atmospheric Administration (NOAA) for approval. The purpose of the program “shall be to develop and implement management measures for nonpoint source pollution to restore and protect coastal waters, working in close conjunction with other State and local authorities”. The Hawai‘i CNPCP follows a Watershed Approach, and activities are coordinated through Hawai‘i’s Implementation Plan for Polluted Runoff Control and considerations for Stormwater Management.

Discussion: The Hawai‘i Dairy Farms is located within the CZMA, which is defined by the State of Hawai‘i as encompassing the entire state. The project improvements are designed to conform to the goals, policies, and objectives of Hawai‘i’s CZM Program. The Proposed Project’s consistency with CZMA programs and policies to protect coastal lands and waters is documented in Sections 3 and 4 of this EIS, including significant measures to minimize or mitigate potential non-point source pollution impacts to the aquatic resources and nearshore coastal waters.
STATE OF HAWAIʻI

5.2 HAWAIʻI STATE CONSTITUTION

The Hawaiʻi Constitution was framed by a Constitutional Convention under Act 334, Session Laws of Hawaiʻi 1949. It was adopted by the people at the election held on November 7, 1950, and was deemed amended when three propositions submitted to the people in accordance with the Act of Congress approved March 18, 1959, 73 Stat 4, Public Law 86-3, were adopted by the people at the election held on June 27, 1959. As so amended, it was accepted, ratified, and confirmed by Congress by the Act of March 18, 1959. It went into effect on August 21, 1959, upon the issuance of a presidential proclamation admitting the state of Hawaiʻi into the Union.

Article XI of the Constitution, “Conservation, Control and Development of Resources,” includes conservation and protection of agricultural lands under Section 3. Following the 1978 Constitutional Convention, Section 3 was amended to require two-thirds vote by the body responsible for reclassification or rezoning to other uses, for lands identified by the State as important agricultural lands.

The State shall conserve and protect agricultural lands, promote diversified agriculture, increase agricultural self-sufficiency and assure the availability of agriculturally suitable lands. The legislature shall provide standards and criteria to accomplish the foregoing. Lands identified by the State as important agricultural lands needed to fulfill the purposes above shall not be reclassified by the State or rezoned by its political subdivisions without meeting the standards and criteria established by the legislature and approved by a two-thirds vote of the body responsible for the reclassification or rezoning action.

5.2.1 ACT 183 (SLH) RELATING TO IMPORTANT AGRICULTURAL LANDS

Article XI of the State Constitution stipulates that the State shall conserve and protect agricultural lands, promote diversified agriculture, increase agricultural self-sufficiency, and assure the availability of agricultural lands through standards and criteria provided by the legislature. The criteria were developed over several decades and have just recently been operationalized on Kauaʻi through the County of Kauaʻi’s own Important Agricultural Lands (IAL) study of the island’s agriculturally zoned lands.

Community concern over loss of agricultural land for another proposed resort on the last stretch of undeveloped Māhāʻulepū coastline prompted protection of 1,533 acres of agricultural lands under the IAL provision of the Hawaiʻi State Constitution (Article XI, Section 3). This constitutional requirement is for conservation and protection of agricultural lands, promotion of diversified agriculture, and increased agricultural self-sufficiency. The IAL designation assures available agriculturally suitable lands to support a diversity of agricultural activities and opportunities that expand agricultural income and job opportunities. In 2011, approximately 1,533 acres of land in Māhāʻulepū were classified by the State Land Use Commission as IAL. This IAL area includes the 557 acres leased by Hawaiʻi Dairy Farms, LLC (HDF), which will be used to fulfill the goals of the important agricultural lands designation, including conservation, diversifying the types of agriculture industries in the state, and providing an opportunity for the state to grow its milk production industry to be more self-sufficient.
5.3 HAWAIʻI STATE PLAN

The Hawaiʻi State Plan establishes a statewide planning system that provides the goals, objectives, and policies that prioritize the directions and concerns of the State of Hawaiʻi. These will be discussed as they relate to the proposed project.

Table 5-1 assesses and evaluates how Hawaiʻi Dairy Farms supports the objectives for Important Agricultural Lands, as promulgated under HRS Chapter 205 Part III. State plan goals are not applicable to this project where noted.

| Table 5-1 Hawaiʻi State Plan, HRS Chapter 205 Part III |
|-----------------|---|---|---|
| S = Supportive, N/S = Not Supportive, N/A = Not Applicable | S | N/S | N/A |
| Section 205-41: Declaration of Policy. |
| It is declared that the people of Hawaiʻi have a substantial interest in the health and sustainability of agriculture as an industry in the State. There is a compelling state interest in conserving the State’s agricultural land resource base and assuring the long-term availability of agricultural lands for agricultural use to achieve the purposes of: |
| (1) Conserving and protecting agricultural lands | X |
| (2) Promoting diversified agriculture | X |
| (3) Increasing agricultural self-sufficiency | X |
| (4) Assuring the availability of agriculturally suitable lands | X |
Table 5-1  Hawai‘i State Plan, HRS Chapter 205 Part III

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</table>

**Discussion:** The project supports the goals of the State of Hawai‘i to promote sustainability in agriculture as an industry, and protecting the long term availability of lands for agriculture use, described further in EIS Sections 2.3 and 4.4.

**Section 205-43: Important agricultural lands; policies.**
State and county agricultural policies, tax policies, land use plans, ordinances, and rules shall promote the long-term viability of agricultural use of important agricultural lands and shall be consistent with and implement the following policies:

1. Promote the retention of important agricultural lands in blocks of contiguous, intact, and functional land units large enough to allow flexibility in agricultural production and management
   - X
2. Discourage the fragmentation of important agricultural lands and the conversion of these lands to nonagricultural uses
   - X
3. Direct nonagricultural uses and activities from important agricultural lands to other areas and ensure that uses on important agricultural lands are actually agricultural uses
   - X
4. Limit physical improvements on agricultural lands to maintain affordability of these lands for agricultural purposes
   - X
5. Provide a basic level of infrastructure and services on important agricultural lands limited to the minimum necessary to support agricultural uses and activities
   - X
6. Facilitate the long-term dedication of important agricultural lands for future agricultural use through the use of incentives
   - X
7. Facilitate the access of farmers to important agricultural lands for long-term viable agricultural use
   - X
8. Promote the maintenance of essential agricultural infrastructure systems, including irrigation systems
   - X

**Discussion:** The project retains and protects existing Important Agricultural Lands, and also provides a basic level of infrastructure necessary to support the agricultural uses and activities of the dairy, as described in EIS Section 4.4.

Table 5-2 assesses and evaluates how Hawai‘i Dairy Farms supports the Hawai‘i State Plan, as promulgated under HRS Chapter 226. State plan goals are not applicable to this project where noted.

Table 5-2  Hawai‘i State Plan, Hawai‘i Revised Statutes, Chapter 226

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<tr>
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**Section 226-4: State Goals.**
In order to guarantee, for the present and future generations, those elements of choice and mobility that insure that individuals and groups may approach their desired levels of self-reliance and self-determination, it shall be the goal of the State to achieve:

1. A strong, viable economy, characterized by stability, diversity, and growth, that enables the fulfillment of the needs and expectations of Hawai‘i’s present and future generations
   - X
2. A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of the people.
   - X
3. Physical, social and economic well-being, for individuals and families in Hawai‘i, that nourishes a sense of community responsibility, of caring, and of participation in community life.
   - X

**Discussion:** The project supports the goals of the State of Hawai‘i to achieve a strong, viable economy, Hawai‘i Dairy Farms’ purpose is to provide sustainable financial and food security for the island of Kaua‘i and the State of Hawai‘i as a whole, further described in EIS Section 2.3.

**Section 226-5: Objective and Policies for Population.**
(A) It shall be the objective in planning for the State’s population to guide population growth to be consistent with the achievement of physical, economic, and social objectives contained in this chapter.
(B) To achieve the population objective, it shall be the policy of this State to:
### Table 5-2  Hawai‘i State Plan, Hawai‘i Revised Statutes, Chapter 226

<table>
<thead>
<tr>
<th></th>
<th>S = Supportive</th>
<th>N/S = Not Supportive</th>
<th>N/A = Not Applicable</th>
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<tbody>
<tr>
<td>(1)</td>
<td>Manage population growth statewide in a manner that provides increased opportunities for Hawai‘i’s people to pursue their physical, social and economic aspirations while recognizing the unique needs of each county.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td>Encourage an increase in economic activities and employment opportunities on the neighbor islands consistent with community needs and desires.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td>Promote increased opportunities for Hawai‘i’s people to pursue their socioeconomic aspirations throughout the islands.</td>
<td>X</td>
<td></td>
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<tr>
<td>(4)</td>
<td>Encourage research activities and public awareness programs to foster and understanding of Hawai‘i’s limited capacity to accommodate population needs and to address concerns resulting from an increase in Hawai‘i’s population.</td>
<td>X</td>
<td></td>
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<tr>
<td>(5)</td>
<td>Encourage federal actions and coordination among major governmental agencies to promote a more balanced distribution of immigrants among states, provided that such actions do not prevent the reunion of immediate family members.</td>
<td>X</td>
<td></td>
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<tr>
<td>(6)</td>
<td>Pursue an increase in federal assistance for states with a greater proportion of foreign immigrants relative to their state’s population.</td>
<td>X</td>
<td></td>
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<tr>
<td>(7)</td>
<td>Plan the development and availability of land and water resources in a coordinated manner so as to provide for the desired levels of growth in each geographic area.</td>
<td>X</td>
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</tbody>
</table>

**Discussion:** The project will not significantly add to Hawai‘i’s residential population growth. Implementation of the project will positively stimulate Hawai‘i’s tax base, and create new jobs both in the short-term construction phase and long-term dairy commerce operations. The project’s development is a coordinated effort to utilize available land and infrastructure, and will ensure valuable resources are utilized in a prudent and efficient manner.

### Section 226-6: Objectives and Policies for the Economy in General.

**A** Planning for the State’s economy in general shall be directed toward achievement of the following objectives:

1. Increased and diversified employment opportunities to achieve full employment, increased income and job choice, and improved living standards for Hawai‘i’s people. | X |
2. A steadily growing and diversified economic base that is not overly dependent on a few industries, and includes the development and expansion of industries on the neighbor islands. | X |

**B** To achieve the general economic objectives, it shall be the policy of this State to:

1. Expand Hawai‘i’s national and international marketing, communication, and organizational ties, to increase the State’s capacity to adjust to and capitalize upon economic changes and opportunities occurring outside the State. | X |
2. Promote Hawai‘i as an attractive market for environmentally and socially sound investment activities that benefit Hawai‘i’s people. | X |
3. Seek broader outlets for new or expanded Hawai‘i business investments. | X |
4. Expand existing markets and penetrate new markets for Hawai‘i’s products and services. | X |
5. Assure that the basic economic needs of Hawai‘i’s people are maintained in the event of disruptions in overseas transportation. | X |
6. Strive to achieve a level of construction activity responsive to, and consistent with, state growth objectives. | X |
7. Encourage the formation of cooperatives and other favorable marketing arrangements at the local or regional level to assist Hawai‘i’s small scale producers, manufacturers, and distributors. | X |
8. Encourage labor-intensive activities that are economically satisfying and which offer opportunities for upward mobility. | X |
9. Foster greater cooperation and coordination between the government and private sectors in developing Hawai‘i’s employment and economic growth opportunities. | X |
10. Stimulate the development and expansion of economic activities which will benefit areas with substantial or expected employment problems. | X |
11. Maintain acceptable working conditions and standards for Hawai‘i’s workers. | X |
12. Provide equal employment opportunities for all segments of Hawai‘i’s population through affirmative action and nondiscrimination measures. | X |
13. Encourage businesses that have favorable financial multiplier effects within Hawai‘i’s economy. | X |
Table 5-2  Hawai‘i State Plan, Hawai‘i Revised Statutes, Chapter 226

<table>
<thead>
<tr>
<th></th>
<th>S = Supportive, N/S = Not Supportive, N/A = Not Applicable</th>
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<tr>
<td>(14) Promote and protect intangible resources in Hawai‘i, such as scenic beauty and the Aloha spirit, which are vital to a healthy economy.</td>
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<tr>
<td>(15) Increase effective communication between the educational community and the private sector to develop relevant curricula and training programs to meet future employment needs in general, and requirements of new, potential growth industries in particular.</td>
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<tr>
<td>(16) Foster a business climate in Hawai‘i - including attitudes, tax and regulatory policies, and financial and technical assistance programs – that is conducive to the expansion of existing enterprises and the creation and attraction of new business and industry.</td>
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</table>

Discussion: Implementation at the contemplated herd size will more than double the existing local milk production in the State of Hawai‘i, developing and revitalizing the State’s dairy industry to provide more fresh milk for local families, while also providing employment opportunities for local communities. The planned improvements will help to stabilize Hawai‘i’s economy and encourage self-sufficiency in the agriculture and dairy industries. HDF will create educational opportunities and will foster an environment for economic expansion.

Section 226-7 Objectives and Policies for the Economy – Agriculture.

(A) Planning for the State’s economy with regard to agriculture shall be directed towards achievement of the following objectives:

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<tbody>
<tr>
<td>(1) Viability of Hawai‘i’s sugar and pineapple industries.</td>
<td></td>
<td>X</td>
<td></td>
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<tr>
<td>(2) Growth and development of diversified agriculture throughout the State.</td>
<td></td>
<td>X</td>
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<tr>
<td>(3) An agriculture industry that continues to constitute a dynamic and essential component of Hawai‘i’s strategic, economic, and social well-being.</td>
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(B) To achieve the agriculture objectives, it shall be the policy of this State to:

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<tr>
<td>(1) Establish a clear direction for Hawai‘i’s agriculture through stakeholder commitment and advocacy.</td>
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<td>X</td>
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<tr>
<td>(2) Encourage agriculture by making best use of natural resources.</td>
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<td>X</td>
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<tr>
<td>(3) Provide the governor and the legislature with information and options needed for prudent decision making for the development of agriculture.</td>
<td></td>
<td>X</td>
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<tr>
<td>(4) Establish strong relationships between the agricultural and visitor industries for mutual marketing benefits.</td>
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<td>X</td>
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<tr>
<td>(5) Foster increased public awareness and understanding of the contributions and benefits of agriculture as a major sector of Hawai‘i’s economy.</td>
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<td>X</td>
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<tr>
<td>(6) Seek the enactment and retention of federal and state legislation that benefits Hawai‘i’s agricultural industries.</td>
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<td>X</td>
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<tr>
<td>(7) Strengthen diversified agriculture by developing an effective promotion, marketing, and distribution system between Hawai‘i’s producers and consumer markets locally, on the continental United States, and internationally.</td>
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<td>X</td>
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<tr>
<td>(8) Support research and development activities that provide greater efficiency and economic productivity in agriculture.</td>
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<tr>
<td>(9) Enhance agricultural growth by providing public incentives and encouraging private initiatives.</td>
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<tr>
<td>(10) Assure the availability of agriculturally suitable lands with adequate water to accommodate present and future needs.</td>
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<td>X</td>
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<tr>
<td>(11) Increase the attractiveness and opportunities for an agricultural education and livelihood.</td>
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<tr>
<td>(12) Expand Hawai‘i’s agricultural base by promoting growth and development of flowers, tropical fruits and plants, livestock, feed grains, forestry, food crops, aquaculture, and other potential enterprises.</td>
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<td>X</td>
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<tr>
<td>(13) Promote economically competitive activities that increase Hawai‘i’s agricultural self-sufficiency.</td>
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<td>X</td>
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<tr>
<td>(14) Promote and assist in the establishment of sound financial programs for diversified agriculture.</td>
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<tr>
<td>(15) Institute and support programs and activities to assist the entry of displaced agricultural workers into alternative agricultural or other employment.</td>
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<tr>
<td>(16) Facilitate the transition of agricultural lands in economically non-feasible agricultural production to economically viable agricultural uses.</td>
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Table 5-2 Hawai‘i State Plan, Hawai‘i Revised Statutes, Chapter 226

<table>
<thead>
<tr>
<th>Objective</th>
<th>S</th>
<th>N/S</th>
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<tbody>
<tr>
<td>Federal Expenditures.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Visitor Industry.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Potential Growth Activities.</td>
<td>X</td>
<td>X</td>
<td>X</td>
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</table>

**Discussion:** While Hawai‘i Dairy Farms supports the State’s policies related to economy and federal expenditures, they are not directly applicable to the Proposed Project.

**Section 226-8 Objective and Policies for the Economy - Visitor Industry.**

(A) Planning for the State’s economy with regard to the visitor industry shall be directed towards the achievement of the objective of the visitor industry that constitutes a major component of steady growth for Hawai‘i’s economy.

(B) To achieve the visitor industry objective, it shall be the policy of this State to:

1. Support and assist in the promotion of Hawai‘i’s visitor attractions and facilities.
2. Ensure that visitor industry activities are in keeping with the social, economic, and physical needs and aspirations of Hawai‘i’s people.
3. Improve the quality of existing visitor destination areas.
4. Encourage cooperation and coordination between the government and private sectors in developing and maintaining well-designed, adequately serviced visitor industry and related developments which are sensitive to neighboring communities and activities.
5. Develop the industry in a manner that will continue to provide new job opportunities and steady employment for Hawai‘i’s people.
6. Provide opportunities for Hawai‘i’s people to obtain job training and education that will allow for upward mobility within the visitor industry.
7. Foster a recognition of the contribution of the visitor industry to Hawai‘i’s economy and the need to perpetuate the aloha spirit.
8. Foster an understanding by visitors of the aloha spirit and of the unique and sensitive character of Hawai‘i’s cultures and values.

**Discussion:** While Hawai‘i Dairy Farms supports the State’s policies related to improving Hawai‘i’s visitor industry, they are not directly applicable to the Proposed Project.

**Section 226-9 Objective and Policies for the Economy - Federal Expenditures.**

(A) Planning for the State’s economy with regard to federal expenditures shall be directed towards achievement of the objective of a stable federal investment base as an integral component of Hawai‘i’s economy.

(B) To achieve the federal expenditures objective, it shall be the policy of this State to:

1. Encourage the sustained flow of federal expenditures in Hawai‘i that generates long-term government civilian employment.
2. Promote Hawai‘i’s supportive role in national defense.
3. Promote the development of federally supported activities in Hawai‘i that respect state-wide economic concerns, are sensitive to community needs, and minimize adverse impacts on Hawai‘i’s environment.
4. Increase opportunities for entry and advancement of Hawai‘i’s people into federal government service.
5. Promote federal use of local commodities, services, and facilities available in Hawai‘i.
6. Strengthen federal-state-county communication and coordination in all federal activities that affect Hawai‘i.
7. Pursue the return of federally controlled lands in Hawai‘i that are not required for either the defense of the nation or for other purposes of national importance, and promote the mutually beneficial exchanges of land between federal agencies, the State, and the counties.

**Discussion:** While Hawai‘i Dairy Farms supports the State’s policies related to economy and federal expenditures, they are not directly applicable to the Proposed Project.

**Section 226-10 Objective and Policies for the Economy - Potential Growth Activities.**

(A) Planning for the State’s economy with regard to potential growth activities shall be directed towards achievement of the objective of development and expansion of potential growth activities that serve to increase and diversify Hawai‘i’s economic base.

(B) To achieve the potential growth activity objective, it shall be the policy of this State to:

1. Facilitate investment and employment in economic activities that have the potential for growth such as diversified agriculture, aquaculture, apparel and textile manufacturing, film and television production, and energy and marine-related industries.
Table 5-2  Hawai‘i State Plan, Hawai‘i Revised Statutes, Chapter 226

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<td>11</td>
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**Discussion:** Hawai‘i Dairy Farms supports the State’s policies by diversifying and enhancing the local agriculture industry in developing dairy, which diversifies the State economy as a whole by providing more economic options to lessen our dependency on tourism, as described in EIS Section 4.15.

**Section 226-10.5 Objectives and Policies for the Economy - Information Industry.**

(A) Planning for the State’s economy with regard to the information industry shall be directed toward the achievement of the objective of positioning Hawai‘i as the leading dealer in information businesses and services in the Pacific Rim.

(B) To achieve the information industry objective, it shall be the policy of this State to:

1. Encourage the continued development and expansion of the telecommunications infrastructure serving Hawai‘i to accommodate future growth in the information industry;  
2. Facilitate the development of new business and service ventures in the information industry which will provide employment opportunities for the people of Hawai‘i;  
3. Encourage greater cooperation between the public and private sectors in developing and maintaining a well-designed information industry;  
4. Ensure that the development of new businesses and services in the industry are in keeping with the social, economic, and physical needs and aspirations of Hawai‘i’s people;  
5. Provide opportunities for Hawai‘i’s people to obtain job training and education that will allow for upward mobility within the information industry;  
6. Foster a recognition of the contribution of the information industry to Hawai‘i’s economy; and  
7. Assist in the promotion of Hawai‘i as a broker, creator, and processor of information in the Pacific.

**Discussion:** While Hawai‘i Dairy Farms supports the State’s policies related to improving Hawai‘i’s information industry, the Proposed Project will not directly impact these policies.

**Section 226-11 Objectives and Policies for the Physical Environment - Land-based, Shoreline, and Marine Resources.**

(A) Planning for the State’s physical environment with regard to land-based, shoreline and marine resources shall be directed towards achievement of the following objectives:

1. Prudent use of Hawai‘i’s land-based, shoreline, and marine resources.  
2. Effective protection of Hawai‘i’s unique and fragile environmental resources.  

(B) To achieve the land-based, shoreline, and marine resources objectives, it shall be the policy of this State to:

1. Exercise an overall conservation ethic in the use of Hawai‘i’s natural resources.  
2. Ensure compatibility between land-based and water-based activities and natural resources and ecological systems.
Table 5-2  Hawai‘i State Plan, Hawai‘i Revised Statutes, Chapter 226

<table>
<thead>
<tr>
<th>Objective and Policy</th>
<th>S</th>
<th>N/S</th>
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<tbody>
<tr>
<td>Take into account the physical attributes of areas when planning and designing activities and facilities.</td>
<td>X</td>
<td></td>
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</tr>
<tr>
<td>Manage natural resources and environs to encourage their beneficial and multiple uses without generating costly or irreparable environmental damage.</td>
<td>X</td>
<td></td>
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<tr>
<td>Consider multiple uses in watershed areas, provided such uses do not detrimentally affect water quality and recharge functions.</td>
<td>X</td>
<td></td>
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<tr>
<td>Encourage the protection of rare or endangered plant and animal species and habitats native to Hawai‘i.</td>
<td>X</td>
<td></td>
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<tr>
<td>Provide public incentives that encourage private actions to protect significant natural resources from degradation or unnecessary depletion.</td>
<td>X</td>
<td></td>
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<tr>
<td>Pursue compatible relationships among activities, facilities and natural resources.</td>
<td>X</td>
<td></td>
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<tr>
<td>Promote increased accessibility and prudent use of inland and shoreline areas for public recreational, educational and scientific purposes.</td>
<td>X</td>
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</tbody>
</table>

Discussion: The project is a balanced development proposal that is compatible to existing uses and relationships in the Māhā’ulepū agricultural region, and measures to protect water resources and water quality are presented in EIS Sections 4.16, 4.17, 4.23 and 4.24. While the project supports the County’s initiatives for shoreline and marine environment protection and conservation, the project is located over one mile inland of the coastline, and does not have any shoreline or marine features.

Section 226-12 Objective and Policies for the Physical Environment - Scenic, Natural Beauty, and Historic Resources.

(A) Planning for the State’s physical environment shall be directed towards achievement of the objective of enhancement of Hawai‘i’s scenic assets, natural beauty, and multi-cultural/historical resources.

(B) To achieve the scenic, natural beauty, and historic resources objective, it shall be the policy of this State to:

1. Promote the preservation and restoration of significant natural and historic resources. X
2. Provide incentives to maintain and enhance historic, cultural, and scenic amenities. X
3. Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features. X
4. Protect those special areas, structures, and elements that are an integral and functional part of Hawai‘i’s ethnic and cultural heritage. X
5. Encourage the design of developments and activities that complement the natural beauty of the islands. X

Discussion: The project will not impact scenic natural resources or historical and cultural resources found in and around the project site. The proposed facilities are in keeping with the agricultural character of the area, and are expected to have minimal impact to public views.

There are no public scenic views or lookouts that will be affected by dairy development or operations. There will be no adverse effect to public views of the Pu‘u Hunihuni crater, views from the Ala Kinoiki Road corridor, or impediment to views of the Mount Ha‘upu.


(A) Planning for the State’s physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives:

1. Maintenance and pursuit of improved quality in Hawai‘i’s land, air, and water resources. X
2. Greater public awareness and appreciation of Hawai‘i’s environmental resources. X

(B) To achieve the land, air, and water quality objectives, it shall be the policy of this State to:

1. Foster educational activities that promote a better understanding of Hawai‘i’s limited environmental resources. X
2. Promote the proper management of Hawai‘i’s land and water resources. X
3. Promote effective measures to achieve desired quality in Hawai‘i’s surface, ground and coastal waters. X
4. Encourage actions to maintain or improve aural and air quality levels to enhance the health and well-being of Hawai‘i’s people. X
5. Reduce the threat to life and property from erosion, flooding, tsunamis, hurricanes, earthquakes, volcanic eruptions, and other natural or man-induced hazards and disasters. X
6. Encourage design and construction practices that enhance the physical qualities of Hawai‘i’s communities. X
7. Encourage urban developments in close proximity to existing services and facilities. X
Table 5-2  Hawai‘i State Plan, Hawai‘i Revised Statutes, Chapter 226

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<tr>
<td>(8) Foster recognition of the importance and value of the land, air, and water resources to Hawai‘i’s people, their cultures and visitors.</td>
<td>X</td>
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</table>

**Discussion:** Best management practices and regulatory controls will ensure air and water quality are within acceptable regulatory limits on-site and within the immediate area.

Section 226-14 Objective and Policies for Facility Systems - In General.

(A) Planning for the State’s facility systems in general shall be directed towards achievement of the objective of water, transportation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives.

(B) To achieve the general facility systems objective, it shall be the policy of this State to:

1. Accommodate the needs of Hawai‘i’s people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.
2. Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.
3. Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user.
4. Pursue alternative methods of financing programs and projects and cost-saving techniques in the planning, construction, and maintenance of facility systems.

**Discussion:** While Hawai‘i Dairy Farms supports the State’s policies related to improving Hawai‘i’s facility systems policies, they are not directly applicable to the Proposed Project.


(A) Planning for the State’s facility systems with regard to solid and liquid wastes shall be directed towards the achievement of the following objectives:

1. Maintenance of basic public health and sanitation standards relating to treatment and disposal of solid and liquid wastes.
2. Provision of adequate sewerage facilities for physical and economic activities that alleviate problems in housing, employment, mobility, and other areas.

(B) To achieve solid and liquid waste objectives, it shall be the policy of this State to:

1. Encourage the adequate development of sewerage facilities that complement planned growth.
2. Promote re-use and recycling to reduce solid and liquid wastes and employ a conservation ethic.
3. Promote research to develop more efficient and economical treatment and disposal of solid and liquid wastes.

**Discussion:** Hawai‘i Dairy Farms does not address domestic waste, the dairy operation is centrally based upon the recycling non-domestic waste as fertilizer to produce locally available feedstock in a pasture-based rotational grazing method, which supports Objective (B)(2).

226-16 Objective and Policies for Facility Systems - Water.

(A) Planning for the State’s facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capacities.

(B) To achieve the facility systems water objective, it shall be the policy of this State to:

1. Coordinate development of land use activities with existing and potential water supply.
2. Support research and development of alternative methods to meet future water requirements well in advance of anticipated needs.
3. Reclaim and encourage the productive use of runoff water and wastewater discharges.
4. Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use.
5. Support water supply services to areas experiencing critical water problems.
6. Promote water conservation programs and practices in government, private industry, and the general public to help ensure adequate water to meet long-term needs.
Table 5-2  Hawai‘i State Plan, Hawai‘i Revised Statutes, Chapter 226

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<th>S = Supportive, N/S = Not Supportive, N/A = Not Applicable</th>
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**Discussion:** Hawai‘i Dairy Farms nutrient management plan is designed to collect, treat, and reuse all livestock waste and wastewater generated from the facility. Fundamentally, this pasture-based dairy will effectively recycle 100% of animal wastes, as presented in EIS Section 3.3. The project is consistent with objectives and policies for water supply and water management, as discussed in EIS Section 4.1.6.

226-17 Objectives and Policies for Facility Systems - Transportation.
(A) Planning for the State’s facility systems with regard to transportation shall be directed towards the achievement of the following objectives:

1. An integrated multi-modal transportation system that services statewide needs and promotes the efficient, economical, safe, and convenient movement of people and goods.  
2. A statewide transportation system that is consistent with and will accommodate planned growth objectives throughout the State.
(B) To achieve the transportation objectives, it shall be the policy of this State to:

1. Design, program, and develop a multi-modal system in conformance with desired growth and physical development as stated in this chapter;  
2. Coordinate state, county, federal, and private transportation activities and programs toward the achievement of statewide objectives;  
3. Encourage a reasonable distribution of financial responsibilities for transportation among participating governmental and private parties;  
4. Provide for improved accessibility to shipping, docking, and storage facilities;  
5. Promote a reasonable level and variety of mass transportation services that adequately meet statewide and community needs;  
6. Encourage transportation systems that serve to accommodate present and future development needs of communities;  
7. Encourage a variety of carriers to offer increased opportunities and advantages to inter-island movement of people and goods;  
8. Increase the capacities of airport and harbor systems and support facilities to effectively accommodate transshipment and storage needs;  
9. Encourage the development of transportation systems and programs which would assist statewide economic growth and diversification;  
10. Encourage the design and development of transportation systems sensitive to the needs of affected communities and the quality of Hawai‘i’s natural environment;  
11. Encourage safe and convenient use of low-cost, energy-efficient, non-polluting means of transportation;  
12. Coordinate intergovernmental land use and transportation planning activities to ensure the timely delivery of supporting transportation infrastructure in order to accommodate planned growth objectives; and  
13. Encourage diversification of transportation modes and infrastructure to promote alternate fuels and energy efficiency.

**Discussion:** While Hawai‘i Dairy Farms supports the State’s policies related to improving Hawai‘i’s transportation systems and practices, they are not directly applicable to the Proposed Project.

(A) Planning for the State’s facility systems with regard to energy shall be directed toward the achievement of the following objectives, giving due consideration to all:

1. Dependable, efficient, and economical statewide energy systems capable of supporting the needs of the people;  
2. Increased energy self-sufficiency where the ratio of indigenous to imported energy use is increased;  
3. Greater energy security in the face of threats to Hawai‘i’s energy supplies and systems; and  
4. Reduction, avoidance, or sequestration of greenhouse gas emissions from energy supply and use.
(B) To achieve the energy objectives, it shall be the policy of this State to ensure the provision of adequate, reasonably priced, and dependable energy services to accommodate demand.
(C) To further achieve the energy objectives, it shall be the policy of this State to:

1. Support research and development as well as promote the use of renewable energy sources;
Table 5-2  Hawai‘i State Plan, Hawai‘i Revised Statutes, Chapter 226

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<th>S = Supportive, N/S = Not Supportive, N/A = Not Applicable</th>
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<tr>
<td>(2)</td>
<td>Ensure that the combination of energy supplies and energy-saving systems is sufficient to support the demands of growth;</td>
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<td>(3)</td>
<td>Base decisions of least-cost supply-side and demand-side energy resource options on a comparison of their total costs and benefits when a least-cost is determined by a reasonably comprehensive, quantitative, and qualitative accounting of their long-term, direct and indirect economic, environmental, social, cultural, and public health costs and benefits;</td>
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<tr>
<td>(4)</td>
<td>Promote all cost-effective conservation of power and fuel supplies through measures including: (A) Development of cost-effective demand-side management programs; (B) Education; and (C) Adoption of energy-efficient practices and technologies;</td>
</tr>
<tr>
<td>(5)</td>
<td>Ensure to the extent that new supply-side resources are needed, the development or expansion of energy systems utilizes the least-cost energy supply option and maximizes efficient technologies;</td>
</tr>
<tr>
<td>(6)</td>
<td>Support research, development, and demonstration of energy efficiency, load management, and other demand-side management programs, practices, and technologies;</td>
</tr>
<tr>
<td>(7)</td>
<td>Promote alternate fuels and energy efficiency by encouraging diversification of transportation modes and infrastructure;</td>
</tr>
<tr>
<td>(8)</td>
<td>Support actions that reduce, avoid, or sequester greenhouse gases in utility, transportation, and industrial sector applications; and</td>
</tr>
<tr>
<td>(9)</td>
<td>Support actions that reduce, avoid, or sequester Hawai‘i’s greenhouse gas emissions through agriculture and forestry initiatives.</td>
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</table>

**Discussion:** Hawai‘i Dairy Farms supports several of the State’s policies related to improving Hawai‘i’s facilities systems in regards to energy usage and conservation. Hawai‘i Dairy Farms environmental commitments, such as energy efficiency and sustainable building operations. The use of solar photovoltaic energy and other energy-efficient technologies are integrated into the dairy farm, refer to EIS Section 3.2. Greenhouse gas emissions are avoided through on-site power generation and on-site waste management.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third the annual increase in atmospheric carbon dioxide.

### 226-18.5 Objectives and Policies for Facility Systems - Telecommunications.

(A) Planning for the State's telecommunications facility systems shall be directed towards the achievement of dependable, efficient, and economical statewide telecommunications systems capable of supporting the needs of the people.

(B) To achieve the telecommunications objective, it shall be the policy of this State to ensure the provision of adequate, reasonably priced, and dependable telecommunications services to accommodate demand.

(C) To further achieve the telecommunications objective, it shall be the policy of this State to:

(1) Facilitate research and development of telecommunications systems and resources; X

(2) Encourage public and private sector efforts to develop means for adequate, ongoing telecommunications planning; X

(3) Promote efficient management and use of existing telecommunications systems and services; and X

(4) Facilitate the development of education and training of telecommunications personnel. X

**Discussion:** While these policies apply more directly to government, Hawai‘i Dairy Farms will continue to incorporate current and efficient telecommunication technologies.

### 226-19 Objectives and Policies for Socio-Cultural Advancement - Housing.

(A) Planning for the State’s socio-cultural advancement with regard to housing shall be directed toward the achievement of the following objectives:

(1) Greater opportunities for Hawai‘i’s people to secure reasonably priced, safe, sanitary, and livable homes, located in suitable environments that satisfactorily accommodate the needs and desires of families and individuals, through collaboration and cooperation between government and nonprofit and for-profit developers to ensure that more affordable housing is made available to very low-, low- and moderate-income segments of Hawai‘i’s population. X
Table 5-2 Hawai‘i State Plan, Hawai‘i Revised Statutes, Chapter 226

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<tr>
<th>S</th>
<th>N/S</th>
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<tr>
<td>(2) The orderly development of residential areas sensitive to community needs and other land uses.</td>
<td>X</td>
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<tr>
<td>(3) The development and provision of affordable rental housing by the State to meet the housing needs of Hawai‘i’s people.</td>
<td></td>
<td>X</td>
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<tr>
<td>(B) To achieve the housing objectives, it shall be the policy of this State to:</td>
<td></td>
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<tr>
<td>(1) Effectively accommodate the housing needs of Hawai‘i’s people.</td>
<td></td>
<td>X</td>
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<tr>
<td>(2) Stimulate and promote feasible approaches that increase housing choices for low-income, moderate-income, and gap-group households.</td>
<td></td>
<td>X</td>
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<tr>
<td>(3) Increase homeownership and rental opportunities and choices in terms of quality, location, cost, densities, style, and size of housing.</td>
<td></td>
<td>X</td>
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<tr>
<td>(4) Promote appropriate improvement, rehabilitation, and maintenance of existing housing units and residential areas.</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>(5) Promote design and location of housing developments taking into account the physical setting, accessibility to public facilities and services, and other concerns of existing communities and surrounding areas.</td>
<td></td>
<td>X</td>
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<tr>
<td>(6) Facilitate the use of available vacant, developable, and underutilized urban lands for housing.</td>
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<td>X</td>
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<tr>
<td>(7) Foster a variety of lifestyles traditional to Hawai‘i through the design and maintenance of neighborhoods that reflect the culture and values of the community.</td>
<td></td>
<td>X</td>
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<tr>
<td>(8) Promote research and development of methods to reduce the cost of housing construction in Hawai‘i.</td>
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**Discussion:** There is no residential development planned as part of Hawai‘i Dairy Farms.

### 226-20 Objectives and Policies for Socio-Cultural Advancement - Health.

(A) Planning for the State’s socio-cultural advancement with regard to health shall be directed towards achievement of the following objectives:

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<tr>
<th>S</th>
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<tbody>
<tr>
<td>(1) Fulfillment of basic individual health needs of the general public.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(2) Maintenance of sanitary and environmentally healthful conditions in Hawai‘i’s communities.</td>
<td>X</td>
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</table>

(B) To achieve the health objectives, it shall be the policy of this State to:

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<tr>
<th>S</th>
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<tbody>
<tr>
<td>(1) Provide adequate and accessible services and facilities for prevention and treatment of physical and mental health problems, including substance abuse.</td>
<td>X</td>
<td></td>
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<tr>
<td>(2) Encourage improved cooperation among public and private sectors in the provision of health care to accommodate the total health needs of individuals throughout the State.</td>
<td>X</td>
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<tr>
<td>(3) Encourage public and private efforts to develop and promote statewide and local strategies to reduce health care and related insurance costs.</td>
<td>X</td>
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<tr>
<td>(4) Foster an awareness of the need for personal health maintenance and preventive health care through education and other measures.</td>
<td>X</td>
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<tr>
<td>(5) Provide programs, services, and activities that ensure environmentally healthful and sanitary conditions.</td>
<td>X</td>
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<tr>
<td>(6) Improve the State’s capabilities in preventing contamination by pesticides and other potentially hazardous substances through increased coordination, education, monitoring, and enforcement.</td>
<td>X</td>
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</table>

**Discussion:** Hawai‘i Dairy Farms’ goals of providing fresh, healthy, locally produced milk to the State of Hawai‘i supports the HRS objectives and policies for health’s role in socio-cultural advancement. By containing and reusing waste and runoff, it also supports the maintenance of sanitary and environmentally healthy conditions in Hawai‘i. Fuels, agricultural chemicals, lubricants, cleaners or potentially hazardous substances will be utilized in compliance with applicable State and Federal requirements.

### 226-21 Objective and Policies for Socio-Cultural Advancement - Education.

(A) Planning for the State's socio-cultural advancement with regard to education shall be directed towards achievement of the objective of the provision of a variety of educational opportunities to enable individuals to fulfill their needs, responsibilities, and aspirations.

(B) To achieve the education objective, it shall be the policy of this State to:

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<th>S</th>
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<tbody>
<tr>
<td>(1) Support educational programs and activities that enhance personal development, physical fitness, recreation, and cultural pursuits of all groups.</td>
<td>X</td>
<td></td>
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<tr>
<td>(2) Ensure the provision of adequate and accessible educational services and facilities that are designed to meet individual and community needs.</td>
<td>X</td>
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<tr>
<td>(3) Provide appropriate educational opportunities for groups with special needs.</td>
<td>X</td>
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<td>Table 5-2 Hawai‘i State Plan, Hawai‘i Revised Statutes, Chapter 226</td>
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<td>S = Supportive, N/S = Not Supportive, N/A = Not Applicable</td>
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<tr>
<td>(4) Promote educational programs which enhance understanding of Hawai‘i’s cultural heritage.</td>
<td>X</td>
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<tr>
<td>(5) Provide higher educational opportunities that enable Hawai‘i’s people to adapt to changing employment demands.</td>
<td>X</td>
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<tr>
<td>(6) Assist individuals, especially those experiencing critical employment problems or barriers, or undergoing employment transitions, by providing appropriate employment training programs and other related educational opportunities.</td>
<td>X</td>
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<tr>
<td>(7) Promote programs and activities that facilitate the acquisition of basic skills, such as reading, writing, computing, listening, speaking, and reasoning.</td>
<td>X</td>
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<tr>
<td>(8) Emphasize quality educational programs in Hawai‘i’s institutions to promote academic excellence.</td>
<td>X</td>
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<tr>
<td>(9) Support research programs and activities that enhance the education programs of the State.</td>
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**Discussion:** While Hawai‘i Dairy Farms supports the State’s policies related to improving Hawai‘i’s educational opportunities, they are not directly applicable to the Proposed Project.

226-22 Objective and Policies for Socio-Cultural Advancement - Social Services.
(A) Planning for the State’s socio-cultural advancement with regard to social services shall be directed towards the achievement of the objective of improved public and private social services and activities that enable individuals, families, and groups to become more self-reliant and confident to improve their well-being.
(B) To achieve the social service objective, it shall be the policy of the State to:

| (1) Assist individuals, especially those in need of attaining a minimally adequate standard of living and those confronted by social and economic hardship conditions, through social services and activities within the State’s fiscal capacities. | X |
| (2) Promote coordination and integrative approaches among public and private agencies and programs to jointly address social problems that will enable individuals, families, and groups to deal effectively with social problems and to enhance their participation in society. | X |
| (3) Facilitate the adjustment of new residents, especially recently arrived immigrants, into Hawai‘i’s communities. | X |
| (4) Promote alternatives to institutional care in the provision of long-term care for elder and disabled populations. | X |
| (5) Support public and private efforts to prevent domestic abuse and child molestation, and assist victims of abuse and neglect. | X |
| (6) Promote programs which assist people in need of family planning services to enable them to meet their needs. | X |

**Discussion:** Hawai‘i Dairy Farms supports the policies for government actions for socio-cultural advancement in regards to social services. However, it is not applicable to the Proposed Project.

(A) Planning for the State’s socio-cultural advancement with regard to leisure shall be directed towards the achievement of the objective of the adequate provision of resources to accommodate diverse cultural, artistic, and recreational needs for present and future generations.
(B) To achieve the leisure objective, it shall be the policy of this State to:

| (1) Foster and preserve Hawai‘i’s multi-cultural heritage through supportive cultural, artistic, recreational, and humanities-oriented programs and activities. | X |
| (2) Provide a wide range of activities and facilities to fulfill the cultural, artistic, and recreational needs of all diverse and special groups effectively and efficiently. | X |
| (3) Enhance the enjoyment of recreational experiences through safety and security measures, educational opportunities, and improved facility design and maintenance. | X |
| (4) Promote the recreational and educational potential of natural resources having scenic, open space, cultural, historical, geological, or biological values while ensuring that their inherent values are preserved. | X |
| (5) Ensure opportunities for everyone to use and enjoy Hawai‘i’s recreational resources. | X |
| (6) Assure the availability of sufficient resources to provide for future cultural, artistic, and recreational needs. | X |
| (7) Provide adequate and accessible physical fitness programs to promote the physical and mental well-being of Hawai‘i’s people. | X |
Table 5-2 Hawai‘i State Plan, Hawai‘i Revised Statutes, Chapter 226

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<tr>
<th>Objective</th>
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<td>(8) Increase opportunities for appreciation and participation in the creative arts, including the literary, theatrical, visual, musical, folk, and traditional art forms.</td>
<td>X</td>
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<tr>
<td>(9) Encourage the development of creative expression in the artistic disciplines to enable all segments of Hawai‘i’s population to participate in the creative arts.</td>
<td>X</td>
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<tr>
<td>(10) Assure adequate access to significant natural and cultural resources in public ownership.</td>
<td>X</td>
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</tbody>
</table>

**Discussion:** Hawai‘i Dairy Farms will not restrict access via Grove Farm / Māhā‘ulepū Farm to historical and culturally significant sites located near the project site to promote and preserve cultural features, traditions and historical properties in the region. Refer to EIS Sections 4.7 and 4.8.

**226-24 Objective and Policies for Socio-Cultural Advancement - Individual Rights and Personal Well-Being.**

(A) Planning for the State’s socio-cultural advancement with regard to individual rights and personal well-being shall be directed towards achievement of the objective of increased opportunities and protection of individual rights to enable individuals to fulfill their socio-economic needs and aspirations.

(B) To achieve the individual rights and personal well-being objective, it shall be the policy of this State to:

1. Provide effective services and activities that protect individuals from criminal acts and unfair practices and that alleviate the consequences of criminal acts in order to foster a safe and secure environment.  
2. Uphold and protect the national and state constitutional rights of every individual.  
3. Assure access to, and availability of, legal assistance, consumer protection, and other public services which strive to attain social justice.  
4. Ensure equal opportunities for individual participation in society.

**Discussion:** Hawai‘i Dairy Farms supports the individual rights and personal well-being of employees through compliance with State and Federal employee rights laws.

**226-25 Objective and Policies for Socio-Cultural Advancement - Culture.**

(A) Planning for the State’s socio-cultural advancement with regard to culture shall be directed toward the achievement of the objective of enhancement of cultural identities, traditions, values, customs, and arts of Hawai‘i’s people.

(B) To achieve the culture objective, it shall be the policy of this State to:

1. Foster increased knowledge and understanding of Hawai‘i’s ethnic and cultural heritages and the history of Hawai‘i.  
2. Support activities and conditions that promote cultural values, customs, and arts that enrich the lifestyles of Hawai‘i’s people and which are sensitive and responsive to family and community needs.  
3. Encourage increased awareness of the effects of proposed public and private actions on the integrity and quality of cultural and community lifestyles in Hawai‘i.  
4. Encourage the essence of the aloha spirit in people’s daily activities to promote harmonious relationships among Hawai‘i’s people and visitors.

**Discussion:** Hawai‘i Dairy Farms supports the policies for government actions for socio-cultural advancement in regards to cultural values and cultural education.

**226-26 Objectives and Policies for Socio-Cultural Advancement - Public Safety.**

(A) Planning for the State’s socio-cultural advancement with regard to public safety shall be directed towards the achievement of the following objectives:

1. Assurance of public safety and adequate protection of life and property for all people.  
2. Optimum organizational readiness and capability in all phases of emergency management to maintain the strength, resources, and social and economic well-being of the community in the event of civil disruptions, wars, natural disasters, and other major disturbances.  
3. Promotion of a sense of community responsibility for the welfare and safety of Hawai‘i’s people.

(B) To achieve the public safety objectives, it shall be the policy of this State to:

1. Ensure that public safety programs are effective and responsive to community needs.  
2. Encourage increased community awareness and participation in public safety programs.  
3. To further achieve public safety objectives related to criminal justice, it shall be the policy of this State to:

1. Support criminal justice programs aimed at preventing and curtailing criminal activities.
### Table 5-2  Hawaiʻi State Plan, Hawaiʻi Revised Statutes, Chapter 226

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<td>(2)</td>
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<td>(3)</td>
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<td>(D)</td>
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<tr>
<td>(2)</td>
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</tbody>
</table>

**Discussion:** Hawaiʻi Dairy Farms takes the responsibility of the wellness and safety of its employees, livestock, and facilities very seriously. Buildings will be designed to appropriate natural disaster and emergency code standards, and staff will be trained to address a range of situations that require immediate response to emergencies or unlawful activity on-site. Response plans are also in place in the event of natural disaster events, further described in EIS Section 4.6.

### 226-27 Objectives and Policies for Socio-Cultural Advancement - Government.

**(A)** Planning the State’s socio-cultural advancement with regard to government shall be directed towards the achievement of the following objectives:

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<tr>
<td>(1)</td>
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<td>X</td>
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<tr>
<td>(2)</td>
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<tr>
<td>(B)</td>
<td></td>
<td>X</td>
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</tbody>
</table>

**Discussion:** Policies related to the operation of State government are the responsibility of the State of Hawaiʻi and are not directly applicable to Hawaiʻi Dairy Farms.

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**226-101 Purpose.**

The purpose of this part is to establish overall priority guidelines to address areas of statewide concern.

**226-102 Overall Direction.**

The State shall strive to improve the quality of life for Hawaiʻi’s present and future population through the pursuit of desirable courses of action in five major areas of statewide concern which merit priority attention: economic development, population growth and land resource management, affordable housing, crime and criminal justice, and quality education.

**226-103 Economic Priority Guidelines.**

**(A)** Priority guidelines to stimulate economic growth and encourage business expansion and development to provide needed jobs for Hawaiʻi’s people and achieve a stable and diversified economy:

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<tr>
<th></th>
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<th>N/A</th>
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</thead>
<tbody>
<tr>
<td>(1)</td>
<td></td>
<td>X</td>
<td></td>
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<tr>
<td>(a)</td>
<td></td>
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</tr>
<tr>
<td>(i)</td>
<td></td>
<td>X</td>
<td></td>
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<tr>
<td>(ii)</td>
<td></td>
<td>X</td>
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<tr>
<td>(iii)</td>
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<td>X</td>
<td></td>
</tr>
<tr>
<td>(iv)</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(v)</td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
### Table 5-2  Hawaiʻi State Plan, Hawaiʻi Revised Statutes, Chapter 226

| (vi) Demonstrate a commitment to provide management opportunities to Hawaiʻi residents. | X |
| (2) Encourage the expansion of technological research to assist industry development and support the development and commercialization of technological advancements. | X |
| (3) Improve the quality, accessibility, and range of services provided by government to business, including data and reference services and assistance in complying with governmental regulations. | X |
| (4) Seek to ensure that state business tax, labor laws, and administrative policies are equitable, rational, and predictable. | X |
| (5) Streamline the building and development permit and review process, and eliminate or consolidate other burdensome or duplicative governmental requirements imposed on business, where public health, safety and welfare would not be adversely affected. | X |
| (6) Encourage the formation of cooperatives and other favorable marketing or distribution arrangements at the regional or local level to assist Hawaiʻi's small-scale producers, manufacturers, and distributors. | X |
| (7) Continue to seek legislation to protect Hawaiʻi from transportation interruptions between Hawaiʻi and the continental United States. | X |
| (8) Provide public incentives and encourage private initiative to develop and attract industries which promise long-term growth potentials and which have the following characteristics: | |
| (a) An industry that can take advantage of Hawaiʻi’s unique location and available physical and human resources. | X |
| (b) A clean industry that would have minimal adverse effects on Hawaiʻi’s environment. | X |
| (c) An industry that is willing to hire and train Hawaiʻi’s people to meet the industry’s labor needs at all levels of employment. | X |
| (d) An industry that would provide reasonable income and steady employment. | X |
| (9) Support and encourage, through educational and technical assistance programs and other means, expanded opportunities for employee ownership and participation in Hawaiʻi business. | X |
| (10) Enhance the quality of Hawaiʻi’s labor force and develop and maintain career opportunities for Hawaiʻi’s people through the following actions: | |
| (A) Expand vocational training in diversified agriculture, aquaculture, information industry, and other areas where growth is desired and feasible. | X |
| (B) Encourage more effective career counseling and guidance in high schools and post-secondary institutions to inform students of present and future career opportunities. | X |
| (C) Allocate educational resources to career areas where high employment is expected and where growth of new industries is desired. | X |
| (D) Promote career opportunities in all industries for Hawaiʻi’s people by encouraging firms doing business in the State to hire residents. | X |
| (E) Promote greater public and private sector cooperation in determining industrial training needs and in developing relevant curricula and on-the-job training opportunities. | X |
| (F) Provide retraining programs and other support services to assist entry of displaced workers into alternative employment. | X |

(8) Priority guidelines to promote the economic health and quality of the visitor industry:

| (1) Promote visitor satisfaction by fostering an environment which enhances the Aloha Spirit and minimizes inconveniences to Hawaiʻi’s residents and visitors. | X |
| (2) Encourage the development and maintenance of well-designed, adequately serviced hotels and resort destination areas which are sensitive to neighboring communities and activities and which provide for adequate shoreline setbacks and beach access. | X |
| (3) Support appropriate capital improvements to enhance the quality of existing resort destination areas and provide incentives to encourage investment in upgrading, repair, and maintenance of visitor facilities. | X |
| (4) Encourage visitor industry practices and activities which respect, preserve, and enhance Hawaiʻi’s significant natural, scenic, historic, and cultural resources. | X |
| (5) Develop and maintain career opportunities in the visitor industry for Hawaiʻi’s people, with emphasis on managerial positions. | X |
| (6) Support and coordinate tourism promotion abroad to enhance Hawaiʻi’s share of existing and potential visitor markets. | X |
### Table 5-2  Hawai‘i State Plan, Hawai‘i Revised Statutes, Chapter 226

<table>
<thead>
<tr>
<th></th>
<th>S = Supportive, N/S = Not Supportive, N/A = Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Maintain and encourage a more favorable resort investment climate consistent with the objectives of this chapter.</td>
</tr>
<tr>
<td>8</td>
<td>Support law enforcement activities that provide a safer environment for both visitors and residents alike.</td>
</tr>
<tr>
<td>9</td>
<td>Coordinate visitor industry activities and promotions to business visitors through the state network of advanced data communication techniques.</td>
</tr>
<tr>
<td>C</td>
<td>Priority guidelines to promote the continued viability of the sugar and pineapple industries:</td>
</tr>
<tr>
<td>1</td>
<td>Provide adequate agricultural lands to support the economic viability of the sugar and pineapple industries.</td>
</tr>
<tr>
<td>2</td>
<td>Continue efforts to maintain federal support to provide stable sugar prices high enough to allow profitable operations in Hawai‘i.</td>
</tr>
<tr>
<td>3</td>
<td>Support research and development, as appropriate, to improve the quality and production of sugar and pineapple crops.</td>
</tr>
<tr>
<td>D</td>
<td>Priority guidelines to promote the growth and development of diversified agriculture and aquaculture:</td>
</tr>
<tr>
<td>1</td>
<td>Identify, conserve, and protect agricultural and aquacultural lands of importance and initiate affirmative and comprehensive programs to promote economically productive agricultural and aquacultural uses of such lands.</td>
</tr>
<tr>
<td>2</td>
<td>Assist in providing adequate, reasonably priced water for agricultural activities.</td>
</tr>
<tr>
<td>3</td>
<td>Encourage public and private investment to increase water supply and to improve transmission, storage, and irrigation facilities in support of diversified agriculture and aquaculture.</td>
</tr>
<tr>
<td>4</td>
<td>Assist in the formation and operation of production and marketing associations and cooperatives to reduce production and marketing costs.</td>
</tr>
<tr>
<td>5</td>
<td>Encourage and assist with the development of a waterborne and airborne freight and cargo system capable of meeting the needs of Hawai‘i’s agricultural community.</td>
</tr>
<tr>
<td>6</td>
<td>Seek favorable freight rates for Hawai‘i’s agricultural products from inter-island and overseas transportation operators.</td>
</tr>
<tr>
<td>7</td>
<td>Encourage the development and expansion of agricultural and aquacultural activities which offer long-term economic growth potential and employment opportunities.</td>
</tr>
<tr>
<td>8</td>
<td>Continue the development of agricultural parks and other programs to assist small independent farmers in securing agricultural lands and loans.</td>
</tr>
<tr>
<td>9</td>
<td>Require agricultural uses in agricultural subdivisions and closely monitor the uses in these subdivisions.</td>
</tr>
<tr>
<td>10</td>
<td>Support the continuation of land currently in use for diversified agriculture.</td>
</tr>
<tr>
<td>E</td>
<td>Priority guidelines for water use and development:</td>
</tr>
<tr>
<td>1</td>
<td>Maintain and improve water conservation programs to reduce the overall water consumption rate.</td>
</tr>
<tr>
<td>2</td>
<td>Encourage the improvement of irrigation technology and promote the use of non-potable water for agricultural and landscaping purposes.</td>
</tr>
<tr>
<td>3</td>
<td>Increase the support for research and development of economically feasible alternative water sources.</td>
</tr>
<tr>
<td>4</td>
<td>Explore alternative funding sources and approaches to support future water development programs and water system improvements.</td>
</tr>
<tr>
<td>F</td>
<td>Priority guidelines for energy use and development:</td>
</tr>
<tr>
<td>1</td>
<td>Encourage the development, demonstration, and commercialization of renewable energy sources.</td>
</tr>
<tr>
<td>2</td>
<td>Initiate, maintain, and improve energy conservation programs aimed at reducing energy waste and increasing public awareness of the need to conserve energy.</td>
</tr>
<tr>
<td>3</td>
<td>Provide incentives to encourage the use of energy conserving technology in residential, industrial, and other buildings.</td>
</tr>
<tr>
<td>4</td>
<td>Encourage the development and use of energy conserving and cost-efficient transportation systems.</td>
</tr>
<tr>
<td>G</td>
<td>Priority guidelines to promote the development of the information industry:</td>
</tr>
<tr>
<td>1</td>
<td>Establish an information network that will serve as the catalyst for establishing a viable information industry in Hawai‘i.</td>
</tr>
<tr>
<td>2</td>
<td>Encourage the development of services such as financial data processing, products and services exchange, foreign language translations, telemarketing, teleconferencing, a twenty-four-hour international stock exchange, international banking, and a Pacific Rim management center.</td>
</tr>
<tr>
<td>3</td>
<td>Encourage the development of small businesses in the information field such as software development, the development of new information systems and peripherals, data conversion and data entry services, and home or cottage services such as computer programming, secretarial, and accounting services.</td>
</tr>
</tbody>
</table>
### Table 5-2  Hawai‘i State Plan, Hawai‘i Revised Statutes, Chapter 226

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>(4) Encourage the development or expansion of educational and training opportunities for residents in the information and telecommunications fields.</td>
<td></td>
<td>X</td>
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</tr>
<tr>
<td>(5) Encourage research activities, including legal research in the information and telecommunications fields.</td>
<td></td>
<td>X</td>
<td></td>
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<tr>
<td>(6) Support promotional activities to market Hawai‘i’s information industry services.</td>
<td></td>
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</tbody>
</table>

**Discussion:** Hawai‘i Dairy Farms supports the HRS objectives to diversify and improve the state economy by revitalizing and developing the local dairy industry in the State, providing more job opportunities for residents while also providing a clean facility that reuses waste, and promotes water and energy reuse and conservation.

### 226-104 Population Growth and Land Resources Priority Guidelines.

**A** Priority guidelines to effect desired statewide growth and distribution:

<table>
<thead>
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<tbody>
<tr>
<td>(1) Encourage planning and resource management to insure that population growth rates throughout the State are consistent with available and planned resource capacities and reflect the needs and desires of Hawai‘i’s people.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(2) Manage a growth rate for Hawai‘i’s economy that will parallel future employment needs for Hawai‘i’s people.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(3) Ensure that adequate support services and facilities are provided to accommodate the desired distribution of future growth throughout the State.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(4) Encourage major state and federal investments and services to promote economic development and private investment to the neighbor islands, as appropriate.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(5) Explore the possibility of making available urban land, low-interest loans, and housing subsidies to encourage the provision of housing to support selective economic and population growth on the neighbor islands.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(6) Seek federal funds and other funding sources outside the State for research, program development, and training to provide future employment opportunities on the neighbor islands.</td>
<td></td>
<td>X</td>
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</tr>
<tr>
<td>(7) Support the development of high technology parks on the neighbor islands.</td>
<td></td>
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</table>

**B** Priority guidelines for regional growth distribution and land resource utilization:

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</tr>
</thead>
<tbody>
<tr>
<td>(1) Encourage urban growth primarily to existing urban areas where adequate public facilities are already available or can be provided with reasonable public expenditures, and away from areas where other important benefits are present, such as protection of important agricultural land or preservation of lifestyles.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(2) Make available marginal or nonessential agricultural lands for appropriate urban uses while maintaining agricultural lands of importance in the agricultural district.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(3) Restrict development when drafting of water would result in exceeding the sustainable yield or in significantly diminishing the recharge capacity of any groundwater area.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(4) Encourage restriction of new urban development in areas where water is insufficient from any source for both agricultural and domestic use.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(5) In order to preserve green belts, give priority to state capital-improvement funds which encourage location of urban development within existing urban areas except where compelling public interest dictates development of a noncontiguous new urban core.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(6) Seek participation from the private sector for the cost of building infrastructure and utilities, and maintaining open spaces.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(7) Pursue rehabilitation of appropriate urban areas.</td>
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<td>X</td>
<td></td>
</tr>
<tr>
<td>(8) Support the redevelopment of Kaka‘ako into a viable residential, industrial, and commercial community.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(9) Direct future urban development away from critical environmental areas or impose mitigating measures so that negative impacts on the environment would be minimized.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(10) Identify critical environmental areas in Hawai‘i to include but not be limited to the following: watershed and recharge areas; wildlife habitats (on land and in the ocean); areas with endangered species of plants and wildlife; natural streams and water bodies; scenic and recreational shoreline resources; open space and natural areas; historic and cultural sites; areas particularly sensitive to reduction in water and air quality; and scenic resources.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(11) Identify all areas where priority should be given to preserving rural character and lifestyle.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
### Table 5-2  Hawai‘i State Plan, Hawai‘i Revised Statutes, Chapter 226

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</thead>
<tbody>
<tr>
<td><strong>12</strong></td>
<td>Utilize Hawai‘i’s limited land resources wisely, providing adequate land to accommodate projected population and economic growth needs while ensuring the protection of the environment and the availability of the shoreline, conservation lands, and other limited resources for future generations.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>13</strong></td>
<td>Protect and enhance Hawai‘i’s shoreline, open spaces, and scenic resources.</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

**Discussion:** Hawai‘i Dairy Farms is an agricultural project in an agriculture district, with agriculturally zoned land, which supports the priority guidelines relating to land resources by keeping agricultural land in active agricultural use (as opposed to residential or resort development). In support of these HRS objectives, Hawai‘i Dairy Farms will finance the cost for building infrastructure and utilities with private funds. Hawai‘i Dairy Farms recognizes its environmental responsibility, and supports the promotion of sustainable business practices through its commitment with its sustainable dairy farm model.

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**226-105 Crime and Criminal Justice Priority Guidelines.**

(A) Priority Guidelines in the Area of Crime and Criminal Justice:

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<thead>
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</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td>Support law enforcement activities and other criminal justice efforts that are directed to provide a safer environment.</td>
<td>X</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>Target state and local resources on efforts to reduce the incidence of violent crime and on programs relating to the apprehension and prosecution of repeat offenders.</td>
<td>X</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>Support community and neighborhood program initiatives that enable residents to assist law enforcement agencies in preventing criminal activities.</td>
<td>X</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>Reduce overcrowding or substandard conditions in correctional facilities through a comprehensive approach among all criminal justice agencies which may include sentencing law revisions and use of alternative sanctions other than incarceration for persons who pose no danger to their community.</td>
<td>X</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>Provide a range of appropriate sanctions for juvenile offenders, including community-based programs and other alternative sanctions.</td>
<td>X</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>Increase public and private efforts to assist witnesses and victims of crimes and to minimize the costs of victimization.</td>
<td>X</td>
</tr>
</tbody>
</table>

**Discussion:** Policies related to public safety are primarily the responsibility of government agencies and are not directly applicable to the Proposed Project. However, Hawai‘i Dairy Farms will institute a program for the safety of its employees with security and emergency response plans, procedures, and training in-place.

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**226-106 Affordable Housing Priority Guidelines.**

(A) Priority guidelines for the provision of affordable housing:

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</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td>Seek to use marginal or nonessential agricultural land and public land to meet housing needs of low- and moderate-income and gap-group households.</td>
<td>X</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>Encourage the use of alternative construction and development methods as a means of reducing production costs.</td>
<td>X</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>Improve information and analysis relative to land availability and suitability for housing.</td>
<td>X</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>Create incentives for development which would increase home ownership and rental opportunities for Hawai‘i’s low- and moderate-income households, gap-group households, and residents with special needs.</td>
<td>X</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>Encourage continued support for government or private housing programs that provide low interest mortgages to Hawai‘i’s people for the purchase of initial owner-occupied housing.</td>
<td>X</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>Encourage public and private sector cooperation in the development of rental housing alternatives.</td>
<td>X</td>
</tr>
<tr>
<td><strong>7</strong></td>
<td>Encourage improved coordination between various agencies and levels of government to deal with housing policies and regulations.</td>
<td>X</td>
</tr>
<tr>
<td><strong>8</strong></td>
<td>Give higher priority to the provision of quality housing that is affordable for Hawai‘i’s residents and less priority to development of housing intended primarily for individuals outside of Hawai‘i.</td>
<td>X</td>
</tr>
</tbody>
</table>

**Discussion:** Hawai‘i Dairy Farms supports the Hawai‘i State Plan Priority Guideline Policy of affordable housing; however, this policy is directed toward government, and does not apply to the Proposed Project.

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**226-107 Quality Education Priority Guidelines.**

(A) Priority guidelines to promote quality education:
**Table 5-2**  Hawai‘i State Plan, Hawai‘i Revised Statutes, Chapter 226  

<table>
<thead>
<tr>
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<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Pursue effective programs which reflect the varied district, school, and student needs to strengthen basic skills achievement.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(2)</td>
<td>Continue emphasis on general education &quot;core&quot; requirements to provide common background to students and essential support to other university programs.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(3)</td>
<td>Initiate efforts to improve the quality of education by improving the capabilities of the education workforce.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(4)</td>
<td>Promote increased opportunities for greater autonomy and flexibility of educational institutions in their decision-making responsibilities.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(5)</td>
<td>Increase and improve the use of information technology in education by the availability of telecommunications equipment for.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(a)</td>
<td>The electronic exchange of information.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>Statewide electronic mail.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>Access to the Internet.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

**Discussion:** Hawai‘i Dairy Farms supports the Hawai‘i State Plan Priority Guideline Policy regarding quality education; however, this policy is directed primarily toward government, and does not apply to the Proposed Project beyond the opportunities the project provides through career development.

226-107 Sustainability Priority Guidelines.

<table>
<thead>
<tr>
<th>(A)</th>
<th>Priority guidelines to promote sustainability:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Encourage balanced economic, social, community, and environmental priorities</td>
</tr>
<tr>
<td>(2)</td>
<td>Encourage planning that respects and promotes living within the natural resources and limits of the State.</td>
</tr>
<tr>
<td>(3)</td>
<td>Promote a diversified and dynamic economy.</td>
</tr>
<tr>
<td>(4)</td>
<td>Encourage respect for the host culture.</td>
</tr>
<tr>
<td>(5)</td>
<td>Promote decisions based on meeting the needs of the present without compromising the needs of future generations.</td>
</tr>
<tr>
<td>(6)</td>
<td>Consider the principles of the ahupua’a system.</td>
</tr>
<tr>
<td>(7)</td>
<td>Emphasize that everyone, including individuals, families, communities, businesses, and government, has the responsibility for achieving a sustainable Hawai‘i.</td>
</tr>
</tbody>
</table>

**Discussion:** Hawai‘i Dairy Farms supports the Hawai‘i State Plan Priority Guideline Policy regarding the promotion of sustainability through its project goals to establish a wastewater reuse, pasture-based dairy in Hawai‘i. HDF will utilize a sustainable, pasture-based rotational grazing system to produce fresh, locally-available milk for the State of Hawai‘i that reduces reliance on imported goods and diversifies the local economy.

226-109 Climate Change Adaptation Priority Guidelines.

<table>
<thead>
<tr>
<th>(A)</th>
<th>Priority guidelines to adapt to climate change:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Ensure that Hawai‘i’s people are educated, informed, and aware of the impacts climate change may have on their communities</td>
</tr>
<tr>
<td>(2)</td>
<td>Encourage community stewardship groups and local stakeholders to participate in planning and implementation of climate change policies</td>
</tr>
<tr>
<td>(3)</td>
<td>Invest in continued monitoring and research of Hawai‘i’s climate and the impacts of climate change on the State.</td>
</tr>
<tr>
<td>(4)</td>
<td>Consider native Hawaiian traditional knowledge and practices in planning for the impacts of climate change.</td>
</tr>
<tr>
<td>(5)</td>
<td>Encourage the preservation and restoration of natural landscape features, such as coral reefs, beaches and dunes, forests, streams, floodplains, and wetlands, that have the inherent capacity to avoid, minimize, or mitigate the impacts of climate change.</td>
</tr>
<tr>
<td>(6)</td>
<td>Explore adaptation strategies that moderate harm or exploit beneficial opportunities in response to actual or expected climate change impacts to the natural and built environments.</td>
</tr>
<tr>
<td>(7)</td>
<td>Promote sector resilience in areas such as water, roads, airports, and public health, by encouraging the identification of climate change threats, assessment of potential consequences, and evaluation of adaptation options.</td>
</tr>
</tbody>
</table>
Table 5-2  Hawai‘i State Plan, Hawai‘i Revised Statutes, Chapter 226

<table>
<thead>
<tr>
<th></th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>(8) Foster cross-jurisdictional collaboration between county, state, and federal agencies and partnerships between government and private entities and other nongovernmental entities, including nonprofit entities.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(9) Use management and implementation approaches that encourage the continual collection, evaluation, and integration of new information and strategies into new and existing practices, policies, and plans.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(10) Encourage planning and management of the natural and built environments that effectively integrate climate change policy.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Discussion:** While Hawai‘i Dairy Farms supports the State’s policies related to prioritizing climate change impacts, they are not directly applicable to the Proposed Project.

## 5.4 HAWAI‘I STATE FUNCTIONAL PLANS

The State Functional Plans implement the goals, objectives, policies and priority guidelines of the Hawai‘i State Plan. The Functional Plans provide the connection between State programs and State policy. Twelve functional plans have been adopted by the State Legislature, including in the areas of agriculture, conservation lands, education, energy, health, higher education, historic preservation, housing, recreation, tourism, transportation and Water Resources. These plans contain multiple objectives and specific action items to be implemented by specific state or county agencies in partnership with named entities such as academic institutions and/or community organizations. The dairy supports the following objectives of the Agriculture Functional Plan:

B. Achievement of an orderly agricultural marketing system through product promotion and industry organization.

E. Achievement of adequate capital, and knowledge of its proper management, for agricultural development

H. Achievement of productive agricultural use of lands most suitable and needed for agriculture

J. Achievement of maximum degree of public understanding and support of agriculture in Hawai‘i.

M. Achievement of adequate support services and infrastructure to meet agricultural needs.

**Discussion:** Hawai‘i Dairy Farms will promote the Functional Plan’s goal of self-sustainability in Hawai‘i, and provide positive marketing for sustainable, locally produced agriculture products that increase public understanding and support of the agriculture industry in the State.

Act 183 of 2005 was enacted to establish Important Agricultural Lands in HRS Chapter 205, Section 205-42. Hawai‘i Dairy Farms will be one of the first commercial food production operations to establish operations using IAL on Kaua‘i.
5.5 HAWAIʻI 2050 SUSTAINABILITY PLAN

The Hawaiʻi 2050 Sustainability Plan was developed in 2008 by the State of Hawaiʻi Sustainability Task Force as follow up to the State Plan and as a long-term strategy in respect to the culture, character, beauty, and history of Hawaiʻi’s island communities; balance among economic, community, and environmental priorities; and an effort to meet the needs of the present without compromising the ability to future generations to meet their own needs.

The 2050 Plan includes five goals toward a more sustainable Hawaiʻi, accompanied by strategic actions for implementation and evaluation. The goals and strategic actions that relate to the Hawaiʻi Dairy Farms project are as follows:

Goal One: Living sustainably is part of our daily practice in Hawaiʻi:

Strategic Actions:

- Develop a sustainability ethic.
- Conduct ongoing forums and cross-sector dialogue to promote collaboration and progress on achieving Hawaiʻi’s sustainability goals.

Discussion: In producing more local milk for Hawaiʻi residents, the project will promote more sustainable consumption practices. In the long-term this will not only promote the ethic of “buying local,” but will also help to alleviate the current amount of fossil fuels consumed to import milk from mainland farms. The pasture-based model used at the dairy, wherein 100 percent of the cows’ manure remains on the farm to enrich the land as fertilizer, will also set the precedent for more sustainable dairy methods in Hawaiʻi, reducing reliance on imports and renewing local soils for future generations.

Goal Two: Our diversified and globally competitive economy enables us to meaningfully live, work, and play in Hawaiʻi.

Strategic Actions:

- Develop a more diverse and resilient economy.

Discussion: Hawaiʻi Dairy Farms aims to further expand Hawaiʻi’s dairy industry by potentially doubling the current production of local milk. In addition to about 10-15 operational jobs, the project will create local supplier opportunities to support the farm operations on Kauaʻi, as well as provide herd management and opportunities for local ranchers. The project also aims to work with Kōloa Elementary School, 4-H and Future Farmers of America to educate local youth about Science Technology Engineering and Mathematics-based agricultural jobs and animal husbandry. Table 5-3 provides an evaluation summary of the project's compatibility with Hawaiʻi 2050’s goals and strategic actions.
Table 5-3  Hawai’i 2050 Sustainability Plan (SB2532 HD1, 2010 Legislative Session)

<table>
<thead>
<tr>
<th>The State’s first definition of sustainability:</th>
<th>( S )</th>
<th>( N/S )</th>
<th>( N/A )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( A. ) Hawai’i that achieves the following:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0 Respects the culture, character, beauty and history of our state’s island communities</td>
<td>( S )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.0 Strikes a balance among economic, social and community, and environmental priorities</td>
<td>( S )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.0 Meets the needs of the present without compromising the ability of future generations to meet their own needs</td>
<td>( S )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GOAL 1: Living sustainably is part of our daily practice in Hawai’i.

Develop a sustainability ethic.

- Integrate sustainability principles and practices into public and private school curricula. \( X \)
- Develop a statewide marketing and public awareness campaign on sustainability principles and practices. \( X \)
- Conduct ongoing forums and cross-sector dialogue to promote collaboration and progress on achieving Hawai’i’s sustainability goals. \( X \)
- Continually monitor trends and conditions in Hawai’i’s economy, society and natural systems. \( X \)

Discussion: Hawai’i Dairy Farms was founded as a sustainable dairy facility, with sustainable practices such as utilizing nutrients in manure to grow the grass as a primary food source for the dairy cows, and a pasture rotational-grazing system to distribute nutrients through the fields.

GOAL 2: Our diversified and globally competitive economy enables us to meaningfully live, work and play in Hawai’i.

Develop a more diverse and resilient economy.

- Provide incentives that foster sustainability-related industries, which include, but aren’t limited to renewable energy, innovation and science-based industries, and environmental technologies. \( X \)
- Increase production and consumption of local foods and products, particularly agricultural products. \( X \)
- Increase commercialization and technology transfer between post-secondary institutions and the business sector. \( X \)

Support the building blocks for economic stability and sustainability.

- Recognize and support established industries such as the visitor industry, military, construction and agriculture as strong components of the Hawai’i economy. \( X \)
- Provide incentives for industries to operate in more sustainable ways. \( X \)
- Attract local and outside capital and investments in Hawai’i’s economic activities. \( X \)
- Reduce regulations and lower the cost of running a business. \( X \)

Increase the competitiveness of Hawai’i’s workforce.

- Invest in and improve our public education system to provide for a skilled workforce. \( X \)
- Create incentives and opportunities for workforce skills upgrade training programs, including the availability of remedial education programs. \( X \)
- Increase student enrollment in post-secondary educational programs. \( X \)
- Adopt living wage guidelines and measurements. \( X \)
- Identify, prioritize and fund infrastructure “crisis points” that need fixing. \( X \)

Discussion: A goal of Hawai’i Dairy Farms is to reinvestigate the island’s dairy industry, allowing for more locally produced food creating local jobs in traditional agriculture product industries, increasing the production of local goods, and decreasing our reliance on mainland and international imports. Hawai’i Dairy Farms also aims to work with local educational institutions to help provide agricultural educational opportunities for future generations.

GOAL 3: Our natural resources are responsibly and respectfully used, replenished and preserved for future generations.

Reduce reliance on fossil (carbon-based) fuels.

- Expand renewable energy opportunities. \( X \)
- Increase energy efficiency in private and public buildings, including retrofitting existing buildings. \( X \)
- Improve energy efficiencies and options in transportation. \( X \)
- Encourage the production and use of locally produced bio-fuels. \( X \)
- Adopt building codes that encourage “green building” technology. \( X \)
- Encourage all government agencies to adopt sustainable practices, including purchasing hybrid cars, buying biodegradable products, and mandating recycling. \( X \)

Conserve water and ensure adequate water supply.

- Reduce water consumption by means of education and incentives. \( X \)
Table 5-3  Hawai‘i 2050 Sustainability Plan (SB2532 HD1, 2010 Legislative Session)

<table>
<thead>
<tr>
<th>S = Supportive, N/S = Not Supportive, N/A = Not Applicable</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encourage greater production and use of recycled water.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continually review water-conserving technologies for possible incorporation in county building codes.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encourage price structures for water use that furthers conservation.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Require water conservation plans from large private users.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase recycling, reuse and waste reduction strategies.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide greater protection for air, and land-, fresh water- and ocean-based habitats.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strengthen enforcement of habitat management.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encourage “smart growth” concepts in land use and community planning.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conserve agricultural, open space and conservation lands and resources.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improve management of protected watersheds areas.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incorporate the values and philosophy of the ahupua’a resource management system, as appropriate.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Establish funding for invasive species control and native ecosystems protection.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create compact patterns of urban development.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research and strengthen management initiatives to respond to rising sea levels, coastal hazards, erosion and other natural hazards.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop a comprehensive environmental mapping and measurement system to evaluate the overall health and status of Hawai‘i’s natural ecosystems.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Discussion:** Hawai‘i Dairy Farms is dedicated to sustainable business operations, as the core operations of the project are based upon creating a sustainable dairy operation that conserves through water reuse that encourages reduction in water use. Using agriculturally zoned land for an agricultural use allows for the conservation of open space and rural land without moving towards larger patterns of urban development.

GOAL 4: Our community is strong, healthy, vibrant and nurturing, providing safety nets for those in need.

Strength social safety nets.

- Increase affordable housing opportunities for households up to 140% of median income. | X |
- Ensure access to affordable health care for all residents. | X |
- Reduce crime and violence. | X |
- Provide access to elderly housing, care-giving and other long-term care services. | X |
- Invest in greater prevention and treatment of those suffering from substance abuse and mental illness. | X |
- Increase awareness of and competency in financial literacy and asset building. | X |
- Strengthen the nonprofit sector, philanthropy and volunteerism. | X |
- Ensure that persons with disabilities are afforded equal opportunity to participate & excel in all aspects of community life. | X |
- Provide after-school and extra-curricular programs to enable Hawai‘i’s youth to broaden their life experiences. | X |

**Improve public transportation infrastructure and alternatives.**

- Reduce traffic congestion. | X |
- Encourage and provide incentives for telecommuting. | X |
- Increase and improve bicycle and pedestrian facilities, including multi-use pathways. | X |

**Strengthen public education.**

- Support parenting, educational and financial literacy initiatives that span early childhood through lifelong learning. | X |
- Increase high school graduation rates. | X |
- Strengthen career pathways for technical and trade schools that enhance Hawai‘i’s workforce. | X |
- Support post-secondary and distance learning programs that broaden personal and professional learning opportunities. | X |
- Provide access to diverse recreational facilities and opportunities. | X |

**Discussion:** While Hawai‘i Dairy Farms supports the State’s policies related to improving Hawai‘i’s social and economic benefit programs for those in need, they are not directly applicable to the Proposed Project.

GOAL 5: Our Kanaka Maoli and island cultures and values are thriving and perpetuated.
Table 5-3  Hawai‘i 2050 Sustainability Plan (SB2532 HD1, 2010 Legislative Session)

<table>
<thead>
<tr>
<th>Honor Kanaka Maoli culture and heritage.</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensure the existence of and support for public and private entities that further the betterment of Kanaka Maoli.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase fluency in Kanaka Maoli language. It is one of the official languages of Hawai‘i.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sponsor cross-sector dialogue on Kanaka Maoli culture and island values.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protect Kanaka Maoli intellectual property and related traditional knowledge.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide Kanaka Maoli cultural education for residents, visitors and the general public.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Celebrate our cultural diversity and island way of life.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify and protect the places, features and sacred spaces that give Hawai‘i its unique character and cultural significance.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase the number of educators who teach cultural and historic education.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enable Kanaka Maoli and others to pursue traditional Kanaka Maoli lifestyles and practices.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide Kanaka Maoli mentors with opportunities to pass on Hawaiian culture and knowledge to the next generation of Kanaka Maoli and others. The power of wisdom comes from communication.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perpetuate Kanaka Maoli food production associated with land and ocean traditions and practices.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide support for subsistence-based businesses and economies.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion: Hawai‘i Dairy Farms supports and honors the state’s Kanaka Maoli heritage through identifying all historical and cultural resources found in and around the project site area.

5.6  HAWAI‘I STATE LAND USE DISTRICT BOUNDARIES

The State of Hawai‘i Land Use Law regulates the classification and uses of lands in the State to accommodate growth and development, and to retain the natural resources in the area. All State lands are classified by the State Land Use Commission as Urban, Rural, Agricultural, or Conservation, with consideration given to the General Plan of the County.

Table 5-4 provides an evaluation and summary of the project’s compatibility with Hawai‘i State Land Use District Boundaries.

Table 5-4  Hawai‘i State Land Use District Boundaries

<table>
<thead>
<tr>
<th>Chapter 205-2 (d) HRS, states that Agricultural districts shall include:</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Activities or uses as characterized by the cultivation of crops, crops for bioenergy, orchards, forage, and forestry;</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Farming activities or uses related to animal husbandry and game and fish propagation...</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion: Hawai‘i Dairy Farms was founded with a core purpose of developing dairy as a farming activity to produce milk in an economically and environmentally sustainable way for the island of Kaua‘i and the State of Hawai‘i as a whole.
5.7 STATE OF HAWAIʻI DEPARTMENT OF AGRICULTURE

The State Department of Agricultural (DOA) is the lead state agency supporting agriculture within the State of Hawaiʻi. Pursuant to HRS §26-16(c), the DOA is tasked with:

- promoting the conservation, development, and utilization of agricultural resources in the State;
- assisting the farmers of the State and any others engaged in agriculture by research projects, dissemination of information, crop and livestock reporting service, market news service, and any other means of improving the well-being of those engaged in agriculture and increasing the productivity of the lands;
- administering the programs of the State relating to animal husbandry, entomology, farm credit, development and promotion of agricultural products and markets, and
- establishing and enforcing rules on the grading and labeling of agricultural products; and
- administering the aquaculture program under HRS §141-2.5.

Additional duties of the DOA include the formulation and implementation of general and special plans, administering HRS Chapter 166 relating to the agricultural park program, and also administering HRS Chapter 167 relating to the irrigation water development program.

**Discussion:** Hawaiʻi Dairy Farms supports the Department of Agriculture’s goals of promoting the conservation and utilization of agricultural resources in the State, improving the productivity of the Māhāʻulepū farm lands, and promoting dairy products and the dairy industry as a whole.

5.8 STATE OF HAWAIʻI WATER POLICIES

Table 5-5 provides an evaluation and summary of the project’s compatibility with State of Hawaiʻi Water Policies.

<table>
<thead>
<tr>
<th>Table 5-5  State of Hawaiʻi Water Policies – Department of Health</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anti-degradation Policy (HAR 11-54-1.1)</strong> Hawaiʻi Administrative Rules pertaining to water quality antidegradation require that existing uses and level of water quality necessary to protect the existing uses of receiving State waters be maintained and protected. In areas where water quality exceeds the standards necessary to support aquatic species and other wildlife, the water quality shall continue to be maintained and protected unless the director finds that allowable lower water quality is needed to accommodate important economic or social developments in the area. The process to allow for lower water quality will depend on intergovernmental coordination and public input provisions, and will be conditioned upon the assurance that the changes in water quality will still be adequate to fully protect existing uses. In addition, all new and existing point sources shall be under the highest statutory and regulatory requirements, and all nonpoint sources shall be under cost-effective and reasonable best management practices.</td>
<td>S</td>
<td>N/S</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Designated Uses (HAR Section 11-54-3)</strong> Classification of the receiving State waters. Storm water discharge shall be allowed given that the waters meet the following requirements:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inland Waters</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Class 1: Waters to remain in their natural state as nearly as possible with an absolute minimum of pollution from any human-caused source. To the extent possible, wilderness character of these areas shall be protected. Waste discharge into these waters is prohibited. Any conduct which results in a demonstrable increase in point or nonpoint source contamination levels in class 1 waters is prohibited.</em></td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 5-5  State of Hawaiʻi Water Policies – Department of Health

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.a.</td>
<td>Uses to be protected in these waters include scientific and educational purposes, protection of native breeding stock, baseline references from which human-caused changes can be measured, compatible recreation, aesthetic enjoyment, and other nondegrading uses which are compatible with the protection of the ecosystems associated with waters of this class;</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.b.</td>
<td>Uses to be protected in these waters are domestic water supplies, food processing, protection of native breeding stock, the support and propagation of aquatic life, baseline references from which human-caused changes can be measured, scientific and educational purposes, compatible recreation, and aesthetic enjoyment. Public access to these waters may be restricted to protect drinking water supplies</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Waters that are protected for their use for recreational purposes, the support and propagation of aquatic life, agricultural and industrial water supplies, shipping, and navigation. The uses to be protected in this class of waters are all uses compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters. These waters shall not act as receiving waters for any discharge which has not received the best degree of treatment or control compatible with the criteria established for this class. No new treated sewage discharges shall be permitted within estuaries. No new industrial discharges permitted within estuaries, with the exception of:</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A)</td>
<td>Acceptable non-contact thermal and drydock or marine railway discharges within Pearl Harbor, Oahu;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B)</td>
<td>Storm water discharges associated with industrial activities which meet, at the minimum, basic water quality criteria applicable to all waters;</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>C)</td>
<td>Discharge covered by a National Pollutant Discharge Elimination System general permit, approved by the U.S. Environmental Protection Agency.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Marine Waters**

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA.</td>
<td>Waters to remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused source or actions. To the extent practicable, the wilderness character of these areas shall be protected. No zones of mixing shall be permitted in this class</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A)</td>
<td>Within a defined reef area, in waters of a depth less than 18 meters; or</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B)</td>
<td>In waters up to a distance of 300 meters off shore if there is no defined reef area and if the depth is greater than 18 meters. The uses to be protected in this class of waters are oceanographic research, the support and propagation of shellfish and other marine life, conservation of coral reefs and wilderness areas, compatible recreation, and aesthetic enjoyment. The classification of any water area as Class AA shall not preclude other uses of the waters compatible with these objectives and in conformance with the criteria applicable to them.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A)</td>
<td>Acceptable non-contact thermal and drydock or marine railway discharges in the following water bodies:</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i.</td>
<td>Honolulu Harbor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii.</td>
<td>Barbers Point Harbor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii.</td>
<td>Keeki Lagoon marina Area</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv.</td>
<td>Ala Wai Boat Harbor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v.</td>
<td>Kahului Harbor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B)</td>
<td>Storm water discharges associated with industrial activities which meet, at the minimum, the basic water quality criteria applicable to all waters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C)</td>
<td>Discharges covered by a NPDES general permit, approved by the US EPA.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Marine Bottom Ecosystems**

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>This objective of this class of waters is to remain as nearly as possible in their natural pristine state with an absolute minimum of pollution from any human-induced source. Uses of marine bottom ecosystems in this class are passive human uses without intervention or alteration, allowing the perpetuation and preservation of the marine bottom in a most natural state, such as for nonconsumptive scientific research, nonconsumptive education, aesthetic enjoyment, passive activities, and preservation.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5-5  State of Hawai‘i Water Policies – Department of Health

<table>
<thead>
<tr>
<th></th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class II: It is the objective of this class of waters to be protected for their uses including fish, shellfish, and wildlife propagation, and for recreational purposes. The uses to be protected in this class are all uses compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation. Any action which may permanently or completely modify, alter, consume, or degrade marine bottoms, such as structural flood control channelization, (dams); landfill and reclamation; navigational structures (harbors, ramps); structural shore protection (seawalls, revetments); and wastewater effluent outfall structures may be allowed upon securing approval in writing from the director, considering the environmental impact and the public interest.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion: During the rainfall and runoff events, the dairy’s nutrient contributions would be further diluted by additional volume of surface runoff and ditch flows. The terminus of Waiopili Ditch is a deep, muddy basin that joins the ocean through a channel cut through beach sand. Water chemistry measurements identified mixing of ditch water occurring rapidly and within a short distance of the shoreline. There will be no substantial effects to marine water quality from the HDF dairy.

5.9  HAWAI‘I COASTAL ZONE MANAGEMENT PROGRAM

The Hawai‘i State Coastal Zone Management Program (CZMP) was enacted by Hawai‘i Revised Statutes 205A – Hawai‘i Coastal Zone Management Act (CZMA), as a requirement of the National Coastal Zone Management Program of 1972. The program provides policy guidance for development activities as they relate to coastal land and water resources. The entire land area of the State of Hawai‘i has been determined to be within the Coastal Zone as defined by the CZMA. The primary objectives and policies of the CZM program that apply to the project include the following:

Table 5-6 discusses how the project addresses the applicable objectives and policies of the CZMA

<table>
<thead>
<tr>
<th>Historic Resources</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Identify and analyze significant archaeological resources</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>B. Maximize information retention through preservation or remains and artifacts or salvage operations.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>C. Support state goals for protection, restoration, interpretation, and display of historic resources.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recreational Resources</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scenic and Open Space Resources</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>B. Encourage those developments that are not coastal dependent to locate in inland areas.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coastal Ecosystems</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>B. Improve the technical basis for natural resource management.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>C. Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>D. Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>E. Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
### Table 5-6 Objectives and Policies of the CZMP

<table>
<thead>
<tr>
<th>Economic Uses</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Concentrate coastal dependent development in appropriate areas.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Ensure coastal dependent development such as harbors and ports, and coastal related development such as visitor industry facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coastal Hazards</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint source pollution hazards.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Ensure that developments comply with requirements of the Federal Flood Insurance Program.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Prevent coastal flooding from inland projects.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Managing Development</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Facilitate timely processing of applications for development permits and resolve overlapping or conflicting permit requirements.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the public to facilitate public participation in the planning and review process.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Public Participation</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Promote public involvement in coastal zone management processes.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Beach Protection</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of improvements due to erosion.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marine Resources</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Discussion:** The site is outside the SMA as delineated by the County of Kaua‘i. An archaeological survey was performed for the project area in compliance with Chapter 6E of the Hawai‘i Revised Statutes, supporting the CZMP’s objective to protect and preserve historic resources. Water quality management practices are promoted by Hawai‘i Dairy Farms through soils conservation, nutrient management, and water monitoring.
COUNTY OF KAUAʻI

5.10 COUNTY OF KAUAʻI GENERAL PLAN

Fulfilling State law mandates and the Charter of the County of Kauaʻi, Kauaʻi’s General Plan provides guidance for the land use regulations, designations, and character of new development and facilities, and planning for County and State facilities and services. The objectives and policies pertaining to the project are as follows:

Table 5-7 discusses how the Proposed Project addresses the applicable objectives and policies of the County of Kauaʻi.

<table>
<thead>
<tr>
<th>Table 5-7 (Elements of the) County of Kaauʻi General Plan</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2.0 Vision for Kauaʻi 2020</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2.1 Community Values</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Protection, management, and enjoyment of our open spaces, unique natural beauty, rural lifestyle, outdoor recreation and parks.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Conservation of fishing grounds and other natural resources, so that individuals and families can support themselves through traditional gathering and agricultural activities.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Access to and along shorelines, waterways and mountains for all. However, access should be controlled where necessary to conserve natural resources and to maintain the quality of public sites for fishing, hunting, recreation and wilderness activities valued by the local community.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Recognition that our environment IS our economy, our natural capital, the basis of our economic survival and success.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Balanced management of our built environment, clustering new development around existing communities and maintaining the four-story height limit.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Diverse job and business opportunities so that people of all skill levels and capabilities can support themselves and their families.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. Government that supports and encourages business.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. Balanced economic growth development promoting providing good jobs and a strong economy, without sacrificing our environment and or our quality of life.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I. Respect and protection for the values and rights of our many cultures, in compliance with our laws and responsibilities as citizens.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J. Preservation of our cultural, historical, sacred and archeological sites.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K. Appreciation and support for the traditions of the Native Hawaiian host culture and the many other cultural traditions and values that make up the Kauaʻi community.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L. Appreciation and support for the visitor industry’s role in preserving and honoring all cultures and their values as Kauaʻi’s leading source of income and as a supporter of community festivals, recreation, arts and culture.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M. Protection of Kauaʻi’s unique character.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N. Recognition of the uniqueness of our communities, supporting people with roots and history in those communities to continue to live and raise their families there.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O. Safety for all citizens and visitors.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. Support for our youth, educating them to succeed.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q. Broad participation in the public process.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2.2 Vision for Kauaʻi 2020</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Caring for Land, Waters and Culture - Through planning and land use regulations, the County of Kauaʻi carefully safeguards its heritage of ecologically- and culturally-important lands, waters and sites.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. A Strong, Diverse Economy - Preservation of Kauaʻi’s special environment and culture, Expanding local markets for local products and reducing imports, resulting in more money remaining in the local economy, More jobs with higher wages, reflecting a variety of profitable businesses seeking qualified employees, A strong education system which prepares Kauaʻi’s children, teens, college students and adults to work in the diversified economy.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5-7  (Elements of the) County of Kauaʻi General Plan

<table>
<thead>
<tr>
<th>S = Supportive, N/S = Not Supportive, N/A = Not Applicable</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. Agriculture and Aquaculture - Agricultural enterprise helps to keep Kauaʻi green and economically healthy through a variety of crops sold locally and exported. Kauaʻi residents support the farmers by buying locally-grown fruits, vegetables, taro and other basic foods. The market for organically-grown crops is increasing. In place of imported meat, Kauaʻi residents enjoy grass-fed beef from cattle raised in Kauaʻi’s pasturelands and prepared in local processing facilities. Kauaʻi now produces 50 percent of its own food, reducing food imports and keeping more money within the community.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. High Technology - Kauaʻi’s high quality of life attracts knowledge-based businesses working in high technology enterprises. These businesses are linked with the college and the high schools, providing internship and training opportunities for Kauaʻi students. After attending college, students are able to find well-paying high-technology jobs on Kauaʻi. All parts of the island are served with fiber optic cable, allowing high-speed communications.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Business Health and Diversity - Small business is the foundation of Kauaʻi’s economy, employing the largest percentage of the population. There is a wide variety of business opportunities, including outdoor recreation, with environmental tourism and sports facilities; support facilities for movies and television; healing, health care, wellness and retreat centers both in alternative health and traditional medicine; assisted living facilities for retirees; innovative power generation; light manufacturing and food processing; authentic Hawaiʻian cultural businesses and cultural education; and home-based cottage businesses networked with electronic marketing.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Opportunities and Prosperity - An attitude of government and community responsibility translates into effective programs that improve employment, housing and educational opportunities for Kauaʻi’s less advantaged citizens. The County, through its Offices of Community Assistance and its Office of Economic Development, works with federal and State programs, business, and the non-profit sector to develop employment opportunities for Kauaʻi’s less advantaged citizens.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. A Vibrant, Stable Visitor Industry - The people of Kauaʻi appreciate the many benefits the visitor industry brings to the island. They, in turn, give the gift of aloha, encouraging guests to return and to stay longer. Residents support the industry’s role in strengthening the economy, preserving the culture, and protecting the environment. In general, residents agree that a healthy, well-managed visitor industry is a major contributor to the quality of life on Kauaʻi.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. A Rural Place - The Island of Kauaʻi is a rural place. “Rural” describes many aspects of Kauaʻi that people value: green, open lands; raising crops for food; small communities where people know each other; the absence of city noise and lights; not feeling crowded. Kauaʻi’s rural character lies not just in those lands classified as “rural” or “agriculture”. Rather, it lies in how the whole island fits together – the relationship of urban settlements to open lands, how the built-up areas relate to the natural features of the landscape, how people get around.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I. Urban Areas - Expansion of urban areas, particularly new shopping centers and other retail developments which attract a large amount of vehicular traffic, are controlled to avoid urban sprawl and strip development along the highway. Town edges are clearly defined, and scenic corridors are maintained along the highways and major roads between towns.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J. Agricultural Lands - Agricultural areas are characterized by broad expanses of open space – a mixture of pastures and large-scale agricultural plantations, small farms, and clusters of residences. Land use regulations specifically provide for agricultural communities, with design standards for subdivisions to preserve open space and landscape features. Land use regulations and tax incentives are structured to promote legitimate agriculture enterprises and to increase opportunities for small farmers.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K. Rural Roads and Highways - Our rural roads retain their “country character.” They are limited to two lanes, bordered with natural vegetation. Speed limits are kept low for safety reasons. The right-of-way may include grassed drainage swales, but there are no sidewalks, curbs or gutters. One-lane bridges have been preserved in the Hanalei-Hāʻena region, both for their historic value and because they slow traffic. Some historic bridges have also been retained in other communities, where traffic volumes are low. Traffic signage is minimal. Safe bicycle and pedestrian routes are provided.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L. Coastal Development - In new resort developments and subdivisions along the coast, buildings are setback from the shoreline in order to serve the following purposes: to avoid potential tsunami or hurricane damage; to preserve dunes, coastal bluffs, and other important physical features; to allow space for coastal erosion, so that there is no need for a seawall and dry beach area is preserved; and to preserve views. Setbacks are based on historic coastal erosion trends, damages during past hurricane and tsunami events, the nature of the topography, and scenic values.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5-7 (Elements of the) County of Kaua‘i General Plan

<table>
<thead>
<tr>
<th>Element</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. Parks and Access to Mountains and Ocean - Visitors share Kaua‘i’s parks, natural areas, and waters in harmony with residents and the environment. The County is implementing a long-range park master plan which is regularly updated and sets priorities for park operations and capital improvements. Each of the major State parks also has an up-to-date master plan, prepared in collaboration with the community.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>N. Towns and Commercial Development - Under the General Plan, new commercial development has been focused on meeting community shopping needs while supporting local small businesses and older business areas. With strategic decisions about highway development and new commercial zoning, the County has avoided strip development and urban sprawl.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>O. Public Facilities and Services - The County of Kaua‘i leads the state in having the lowest per capita rate of waste generation and the highest rate of reuse and recycling. The County is a leader in adopting and applying “best management practices” for land use, site development and construction. Because of careful management and regulation, Kaua‘i is free of concrete-lined drainage channels.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>P. Electrical Power - Residents of Kaua‘i County are dedicated to the efficient use of energy and to minimizing the deleterious health, safety and aesthetic impacts of power installations. In particular, the county seeks opportunities and economic methods to render facilities (including transmission lines) inconspicuous in order to enhance a “parklike” appearance throughout the island.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Q. Airports and Harbors - Līhu‘e Airport is continually upgraded in order to support the desired level of visitor industry development and the export of agricultural products to the mainland. The commercial harbors at Nāwiliwili and Port Allen are continually upgraded to accommodate the latest cargo shipping systems.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>R. Community Participation - Kaua‘i citizens enjoy a rich civic life because of their individual and collective commitment to each other’s well-being and respect for the place. Key values are trust, mutual respect, and a determination to maintain open dialogue. Citizens of all ages, ethnic heritages, and income levels actively participate in community life at many levels and through a variety of activities. Community organizations inform citizens and mobilize them to participate in dialogue. Government agencies and public officials provide fair and equal access to information and assistance for all citizens; give adequate notice of proposed actions; conduct open meetings; and make public records accessible.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Discussion: Hawai‘i Dairy Farms embodies the Kaua‘i Vision for 2020 through preserving Kaua‘i’s rural character through non cluster non-urban development, while keeping Kaua‘i green and economically healthy through a sustainable and progressive dairy model that expands local markets and reduces imports.

3.0 Caring for Land, Water and Culture

3.1.1 Heritage Resources Maps

<table>
<thead>
<tr>
<th>Element</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. The Heritage Resources Map depicts natural, cultural and scenic resources that are important to the County of Kaua‘i and that are intended to be conserved. The mapping of important landforms, streams and other physical elements represents the general location of the resource.</td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

3.1.2 State Responsibility

<table>
<thead>
<tr>
<th>Element</th>
<th>S</th>
<th>N/S</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. The State of Hawai‘i plays the preeminent role in managing natural resources. The Department of Land and Natural Resources (DLNR) controls and manages the forest reserves, natural area reserves, and state parks. In addition to their value as forested watershed, these lands also harbor rare and endangered plant and animal species and areas where the native ecosystem remains relatively intact. In regulating land use on urban and agricultural lands, the County seeks expert advice from DLNR on aquatic and marine resources, streams, rare and endangered species, and historic and archaeological resources.</td>
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3.2 Scenic Views

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<tr>
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<tr>
<td>A. In developing public facilities and in administering land use regulations, the County shall seek to preserve scenic resources and public views. Public views are those from a public place, such as a park, highway, or along the shoreline. In maintaining scenic resources, Preserve the scenic qualities of mountains, hills and other elevated landforms, qualities such as the silhouette against the horizon and the mass and shape of the landform.</td>
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3.3 Historic and Archaeological Resources

3.3.1 Overview and 3.3.2 Policy

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<th>Element</th>
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<tr>
<td>A. As stated in the Vision, the people of Kaua‘i value their cultural and historic places and traditions. Many individuals and organizations care for these resources on a daily basis. Here are some examples: taking care of a heiau; organizing a Bon dance; cultivating taro in ancient taro lo‘i; interpreting historic sites to visitors;</td>
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Table 5-7  (Elements of the) County of Kauaʻi General Plan

<table>
<thead>
<tr>
<th>S = Supportive, N/S = Not Supportive, N/A = Not Applicable</th>
<th>S</th>
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<tr>
<td>restoring historic buildings; attending an exhibit of Kauaʻi artists at the Kauaʻi Museum. Historic and cultural resources help to give Kauaʻi its unique identity – to establish a “sense of place.” Preserve important archaeological and historic sites and provide: (1) a buffer area between the site and adjacent uses; and (2) public pedestrian access, as appropriate to the site.</td>
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3.4 Watersheds, Streams and Water Quality

A. As stated in the Vision, the modern concept of watershed management mirrors the Native Hawaiʻian land use principles and practices under the ahupuaʻa land divisions. Like the modern concept of “watershed,” the ahupuaʻa recognizes the integral connection among land-based, stream-based, and ocean-based resources and activities. X

B. Watersheds are affected by natural events and human activities that cause changes in land and in the flow of water from the high mountains to the ocean. Current Federal and State clean water programs are targeting “nonpoint source pollution control,” with specific emphasis on protecting coastal waters from polluted runoff. County agencies fulfill particular functions in a network of regulations and agencies that control polluted runoff X

3.5 Coastal Lands

A. As mandated under the State CZM Act, the County has delineated the boundaries of the coastal Special Management Area on Kauaʻi and has adopted regulations to manage development within the SMA. The SMA regulations have been effective in mitigating the effects of new development, particularly in preserving natural and cultural resources and providing permanent public access to the beach. The SMA regulations, however, do not supersede zoning; the SMA regulations state that development must be “consistent” with the General Plan and zoning. Since SMA permits must be consistent with zoning, it is important that coastal lands be zoned based on a policy of preserving natural, cultural and scenic resources and preventing hazards to structures and the coastal environment. X

3.6 Native Hawaiian Rights

A. Under the State Constitution and the County Charter, the County of Kauaʻi is empowered to promote the health, safety and welfare of all inhabitants without discrimination as to ethnic origin. As part of carrying out its responsibilities under the Constitution and the Charter, the County recognizes the rights of native Hawaiians and the laws concerning lands and waters that have been established through the State Constitution, State and Federal laws, and State and Federal court decisions. No County ordinance or rule shall modify or diminish these rights. X

Discussion: Hawaiʻi Dairy Farms facilities are expected to have minimal to no impact on views of the Puʻu Hunihuni crater, views from the Ala Kinoiki Road corridor, or the views of the Haupu Mountains surrounding the project. There are no public scenic views or lookouts that would be affected by this project. Construction of the Hawaiʻi Dairy Farms and associated facility improvements is expected to have minimal effects on the existing groundwater systems and local watersheds. The project area is not a source of groundwater recharge, such as a forest reserve or conservation area.

4.0 Developing Jobs and Businesses

4.1 Diversifying the Economy

A. Diversifying the economy is a major theme of Kauaʻi Vision 2020 (Chapter 2). The objective is to strengthen various sectors of Kauaʻi’s economy, so that Kauaʻi is less dependent on a single industry – i.e., the visitor industry. Through the Kauaʻi General Plan Update process, the Citizens Advisory Committee (CAC) has identified three developing industries as having the greatest promise for the future: agriculture, aquaculture, and high technology. These are addressed in Sections 4.3 and 4.4 below (in this plan, aquaculture is discussed as a subset of agriculture). X

4.2 Visitor Industry

A. The visitor industry is the most significant economic force on Kauaʻi, as it is in the state as a whole. It is estimated that about 40 percent of Kauaʻi’s jobs are dependent on the visitor industry. Therefore, the economy of Kauaʻi is to a large extent determined by the number of visitors drawn to the island, how long they stay, and how much they spend. Given the existing supply of Resort-designated land, there is no cause to make major redesignations through the General Plan Update. The addition of the two West Side sites provides a potential for visitor industry development not previously available in that region. X
### Table 5-7 (Elements of the) County of Kaua‘i General Plan

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<tr>
<td><strong>4.3 Agriculture</strong></td>
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<tr>
<td>A. Diversified agriculture, defined as products other than sugar and pineapple, is an industry that has strong potential to be a major force in the pursuit of the 2020 Vision for economic diversification. It is a particularly important time to encourage further development of the industry since the closure of Amfac’s Līhu’e and Kekaha sugar plantations is not a matter of “if” but a matter of “when”. Further development of this industry is highly desirable because it keeps valuable agricultural lands in productive use. It also has the added benefit of preserving rural lands from development.</td>
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<td><strong>4.4 High Technology</strong></td>
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<tr>
<td>A. Further development of the island’s high technology sector would not only create new jobs, but would also provide Kaua‘i residents with, on average, higher paying jobs. Kaua‘i’s high cost of living and dependence on the relatively low-paying service sector, increases the attractiveness of developing a strong high technology industry.</td>
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<td><strong>4.5 Supporting Businesses and Jobs for Kaua‘i Residents</strong></td>
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<tr>
<td>A. Support and encourage the development of a wide range of small businesses, including home-based businesses.</td>
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<td>B. Eliminate unnecessary land use and other regulations, clarify regulatory requirements, and reduce the time for processing permit applications wherever possible.</td>
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<td>C. Support small business by providing needed infrastructure to towns and urban centers.</td>
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<td>D. Develop and support business and technical assistance programs.</td>
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<td>E. Strengthen the public education system in order to equip Kaua‘i’s children, teens, college students, and adults with the knowledge and skills needed to obtain a wellpaying job or start a business.</td>
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<td>F. Work with employers to provide career opportunities and training for local youth. Seek commitments from new or expanding businesses that they will actively recruit and train Kaua‘i residents for new jobs.</td>
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<td><strong>4.6 Land Supply for Commercial &amp; Industrial Uses</strong></td>
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<tr>
<td>A. The County supports commercial and industrial development on appropriately zoned lands by providing the necessary infrastructure and services. Develop vacant lands with existing commercial and industrial zoning, to the extent feasible, before approving new commercial and industrial zoning.</td>
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<td>B. Concentrate commercial and industrial development, particularly new shopping centers which attract a large amount of vehicular traffic, in Kaua‘i’s major towns and job centers in order to minimize highway traffic and avoid urban sprawl and strip development. Concentrate commercial development in Līhu’e, other urban centers, and in town centers. The County shall strive for a balance between meeting community shopping needs with new commercial development and supporting local small businesses in older business areas.</td>
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<td><strong>4.7 Airports</strong></td>
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<td>A. The State Department of Transportation, Airports Division, operates two facilities on Kaua‘i: Līhu’e Airport, the primary air terminal for the island; and Pt. Allen Airport, a general aviation airport with minimal facilities. Policies are to support improvements to Līhu’e Airport as necessary to provide for the desired level of visitor industry development and the export of agricultural products to the mainland and to support centralization of State-owned helicopter facilities and operations at Līhu’e Airport.</td>
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<td><strong>4.8 Commercial Harbors</strong></td>
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<tr>
<td>A. Kaua‘i’s two commercial harbors, Nāwiliwili Harbor and Port Allen, are owned by the State of Hawai‘i and operated by the State Department of Transportation (DOT), Harbors Division. Policies are to develop capital improvements to Nāwiliwili Harbor to support the future needs of cruise ships and cargo vessels, develop ground transportation facilities, pedestrian circulation improvements, and terminal facilities at Nāwiliwili Harbor that will accommodate 2,000-passenger cruise ships, develop shuttle and other transportation improvements to move people out of the Nāwiliwili Harbor area to various recreation, shopping and cultural attractions, and to integrate planning for commercial facilities and Nāwiliwili Beach Park with the harbor master plan.</td>
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<td><strong>4.9 Harbor Facilities</strong></td>
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<tr>
<td>A. Support improvements to Kīkīaola Harbor, in order to serve local fishing and recreation needs, to develop ocean-oriented businesses, and to serve as a cruise ship drop-off site. Encourage the development of parking and other facilities to expand the capacity of Port Allen Harbor and provide improved service. Support facilities expansion at Kukui‘ula Small Boat Harbor.</td>
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Table 5-7  (Elements of the) County of Kaua‘i General Plan

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Discussion: Agriculture is one of the three developing industries identified by the CAC as having the greatest promise for future diversification of the Kaua‘i economy. Hawai‘i Dairy Farms will keep valuable agricultural lands in productive use, and preserve the rural qualities of the region from undesirable urban development.

5.0 Preserving Kaua‘i’s Rural Character

5.1.1  Basic Policy

A. Enhance Urban Centers and Towns and maintain their identity by defining the Town Center and the edges of each Town. Concentrate shopping and other commercial uses in Town Centers. Encourage residential development within Urban and Town Centers and in Residential Communities contiguous to them. X

B. Promote compact urban settlements in order to limit public service costs and to preserve open space. X

C. Define and conserve Scenic Roadway Corridors along the roadways that connect Towns, Resort areas, and Residential Communities. These corridors are intended to conserve the open space between towns and to prevent sprawl and commercial strip development. X

5.2 Agricultural Lands

A. Lands included within the Agriculture designation shall be predominantly used for or held in reserve to be used in the future for agricultural activities. These activities include the breeding, planting, nourishing and caring for, gathering, and processing of any animal or plant organism, including aquatic animals and plants, for the purpose of producing food or material for non-food products; the commercial growing of flowers or other ornamental plants; the commercial growing of forest products; and the commercial breeding and caring for domestic animals and pets. X

B. The primary intent of the Agriculture designation is to conserve land and water resources in order to:
   (1) insure an excellent resource base for existing and potential agricultural uses;
   (2) assure a sufficient supply of land available for sale or lease at a cost that is economically feasible for agricultural enterprise; and
   (3) promote and preserve open agricultural lands as a key element of Kaua‘i’s rural character and lifestyle, essential to its image as “The Garden Island” and to the continued viability and development of Kaua‘i’s visitor industry. X

C. In administering zoning and subdivision regulations, the County shall seek to preserve important agricultural lands. Important agricultural lands include those designated “A” or “B” by the Land Study Bureau evaluation or “Prime” or “Unique” by the Agricultural Lands of Importance State of Hawai‘i evaluation; provided that these ratings shall be superseded at such time as the State of Hawai‘i officially maps and designates Important Agricultural Lands, as mandated in the State Constitution. X

D. Lands designated Agriculture shall include: important agricultural lands; lands in active agricultural use; lands with potential for agriculture, silviculture or aquaculture; and other lands not suited for urban development because of location, topography, economy of public services, or other purpose related to general health, safety and welfare. X

E. The secondary intent of the Agriculture designation is to provide an opportunity for Kaua‘i citizens to reside in an agricultural community. An “agricultural community” is an area that has both agricultural uses and residences. Typically, an agricultural community is established through subdivision of land and provision of roads and potable water service. Agricultural communities are generally located in outlying areas, do not have convenient access to County facilities, and may not receive the full range or highest level of County services such as are available to residential communities, towns, and urban centers. X

F. The primary intent of the Agriculture designation shall take precedence over the secondary intent. X

G. To implement the Agriculture designation, specific controls on the subdivision and alteration of designated lands shall be formulated to prevent the dissipation of agricultural potential, the loss of rural character, and the dispersal of residential and other urban uses. X

H. The following principles shall be applied in the development of an agricultural community:
   (1) maintain irrigation works and easements where feasible and beneficial to existing or potential agricultural uses within the site or downstream; and
   (2) preserve wetlands and streams and provide a riparian buffer area to prevent land disturbance and to filter runoff. X
### Table 5-7  (Elements of the) County of Kaua‘i General Plan

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<tr>
<td><strong>5.3 Open Lands</strong></td>
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</table>
| A. The intent of the Open designation is to preserve, maintain or improve the natural characteristics of non-urban land and water areas that: &nbsp;&n

| **5.4 Urban Land Uses** |   |     |     |
| A. One of the key policies in the Framework for preserving Kaua‘i’s rural character is to promote growth and development in compact urban areas. Urban lands comprise only four to five percent of Kaua‘i’s land area, leaving 55 percent in conservation and 40 percent in agriculture. This section sets policy for the following urban land use designations: Urban Center, Resort, Residential Community, Transportation, Military and Parks. | X |

| **5.5 Scenic Roadway Corridors** |   |     |     |
| A. The purpose of designating Scenic Roadway Corridors is to conserve open space, scenic features, and views within and along Kaua‘i’s most heavily-traveled routes. The policy of conservation recognizes the vital function of these roadways in meeting the public need for transportation. It also recognizes the legitimate desire of private landowners to make economic use of their lands. The intent of this policy is to establish basic principles for roadway design and land use within these scenic corridors and to provide a basis for County action to establish programs and regulations to implement them. | X |

| B. Scenic Roadway Corridors are primarily designated in areas between towns where the surrounding lands are primarily designated Agriculture and Open. Where a Scenic Roadway Corridor is designated within a town or adjoins an area planned for urban use, the primary intent is to promote setbacks, landscaping, and views of scenic features. Scenic Roadway Corridors are intended to provide design guidance but not to restrict the principal land uses of urban areas. | X |

**Discussion:** The goals of the Hawai‘i Dairy Farms are in accordance with the ideals set forth by the Kaua‘i General Plan (2000), as it insures a resource base for agricultural uses, promotes and preserves open agricultural lands as a key element of Kaua‘i’s rural character and lifestyle, and preserves Important Agricultural Lands and "Prime" agricultural lands for the agricultural uses of the dairy farm.

### 6.0 Enhancing Towns & Communities and Providing for Growth

#### 6.4 Kōloa-Po‘ipū-Kalāheo

| A. Located on the sunny south shore, the Kōloa-Po‘ipū-Kalāheo Planning District is home to Kaua‘i’s largest resort destination as well as some of the most active agricultural businesses. Hotels and resort condominiums are centered around the beaches and golf courses of Po‘ipū. Visitors are drawn to bicycling and ocean recreation activities, as well as attractions such as the Allerton Gardens at Lāwa‘i Kai, the historic towns. Large- and small-scale agricultural activities are located principally in the sunny, well-irrigated coastal lands makai of Kūhiō Highway. Corporate agriculture operations, such as the A&B coffee plantation and the seed corn facility, are located in the area west of Kukui‘ula and the area south and east of Kōloa. Smaller farms and private agricultural parks occupy leased lands throughout the region. Range-fed cattle and other livestock are raised on the pasturelands around Lāwa‘i and Kalāheo, as well as on lands further mauka. | X |
### Table 5-7  (Elements of the) County of Kaua‘i General Plan

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<thead>
<tr>
<th>Issues &amp; Opportunities</th>
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<tr>
<td><strong>6.4.3 Issues &amp; Opportunities</strong></td>
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<tr>
<td>A. Māhā'ulepū. Grove Farm has proposed low-scale resort development extending east from the Hyatt Regency to Māhā'ulepū, mauka of the shoreline area (which lies in the State Conservation District). Significant archaeological, historic and natural features are located in the shoreline area. The lands proposed for development are designated Open and Agricultural on the General Plan Land Use Map. Grove Farm has outlined the land areas proposed for re-designation but has not proposed any specific development or number of visitor units. Access to the Māhā'ulepū and Kawaiola Bay beaches is currently allowed over unpaved canehaul roads, and use by both residents and visitors is increasing. Grove Farm’s proposal calls for preserving significant cultural and natural resources, setting aside the shoreline area as a natural resource park, and improving public access to the shoreline. Community and environmental groups have expressed concern that development would lead to overuse and degradation and loss of special natural resources. They value the scenic qualities of the area and question the need to extend resort facilities further along the southern shoreline.</td>
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<td>B. Wastewater Disposal. There is no County wastewater system serving the Kalāheo-Kōloa-Po'ipū Planning District. Currently, 13 privately-owned treatment plants serve the resort developments in Po'ipū. All but one dispose of effluent using injection wells. As these systems age, they are subject to failure. In addition, County septage pumping logs reveal that Kōloa Town, Lāwa‘i Town and Lāwa‘i Estates have chronic problems with failed individual wastewater systems (septic tank or cesspool). Alexander &amp; Baldwin has developed a 1.1 mgd aerated lagoon plant to serve the Kukui‘ula project and Kōloa Town. It could be converted into a County regional plant, serving the entire Po‘ipū area, but this would be expensive. What should be the long-range plan for wastewater treatment and disposal in this growing resort area?</td>
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<td><strong>6.4.4.2 Policies</strong></td>
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<tr>
<td>A. Māhā'ulepū. Involve the community in planning for the future of Māhā'ulepū. Planning should take into consideration various interests and factors, including but not limited to: the long-term need for managing Māhā'ulepū lands to preserve their significant natural and cultural features; the owner’s desire to develop revenue-producing uses in a way that is sensitive to the area's unique qualities; the need to secure permanent public access to the shoreline; and the potential to create a coastal park.</td>
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<tr>
<td>B. Māhā'ulepū. This area needs a community-based planning effort that engages the landowner and local community interests, drawing upon the County government, the State DLNR, and various professional experts, as needed. Options for the area include some development in exchange for a park and/or preservation areas; or purchase of the land for a State park.</td>
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**Discussion:** Hawai‘i Dairy Farms supports the County's policies related to improving Kaua‘i’s towns and communities and providing for growth, these are not directly applicable to the proposed project. The dairy farm represents a sustainable revenue generating operation on the inland Important Agricultural Land, and is generally supportive of these policies with community engagement throughout its planning process. Long-term operation of the dairy does not preclude the future potential for a coastal park at Māhā'ulepū.

### 7.0 Building Public Facilities and Services

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<tr>
<td>A. In order to preserve rural character and provide for growth in jobs, businesses and households, the County will need to support development within planned urban centers and residential communities. Building basic services involves both the County and State governments. The services include Regional Highways and Roads, Bus Transit, Bikeways, Water Supply, Wastewater Treatment, Drainage and Flood Control, Electrical Power, Solid Waste, Parks and Recreation, Police and Fire Safety, and Schools.</td>
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### 7.4 Water Supply

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<tr>
<td>A. In general, Kaua‘i’s municipal water systems have adequate source and storage capacity to support the existing maximum water demand and provide storage for fire emergencies. Many systems, however, operate at or near capacity. As a result, DOW places certain operational restrictions on requests for new service. In order to accommodate future growth, most of the water systems would need to be expanded.</td>
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### 7.5 Wastewater Treatment

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<td>A. Wastewater treatment varies from community to community. The County provides service to a few communities; other communities and larger developments have private treatment systems; and many residents and businesses rely on Individual Wastewater Systems (IWSs) – i.e., cesspools and septic tank systems. In general, wastewater disposal is adequate and does not pose a significant public health or</td>
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environmental threat. The State Department of Health (DOH) regulates the operations of both County and private wastewater systems. The effluent of most County and private plants is used for irrigation. Service needs include a few areas of Kaua‘i that have failing individual IWSs, but commercial pumping services keep these from becoming a significant problem. The Water Quality Management Plan for the County of Kaua‘i (November 1993) discusses the need to create a regional system serving Kolōa Town, which has subsurface disposal problems, and Po‘ipū, where smaller visitor properties and residences are currently served by a variety of small private plants. Because these plants dispose of effluent by ground injection, there is a long-term risk of polluting adjacent ocean waters. The long-range concept is for the County to develop the regional system by expanding the Kukuiʻula sewage treatment plant and assuming responsibility for plant operation. Effluent disposal is a critical factor hindering development of a regional system.

### 7.6 Drainage and Flood Control

A. Kauaʻi Vision 2020 (Chapter 2) describes a future in which “Kaua‘i streams run freely in their natural courses... Because of careful land management, Kaua‘i is free of concrete-lined drainage channels.” The Vision and the policy statements that follow describe Kaua‘i’s present situation as well as goals for the future. Policies include:

   - Establish zoning and subdivision regulations that (1) strictly limit development on lands that are steeply-sloped and/or have highly erodible soils, in order to prevent flooding, landslides and nonpoint pollution; and (2) strictly limit development on shoreline lands within coastal flood hazard areas or susceptible to shoreline erosion.
   - Focusing on the most heavily impacted urban watersheds, evaluate flooding and erosion risks and develop long-range plans for drainage and flood hazard management. Establish an ongoing program to clear streams and drainageways and maintain their capacity to accommodate stormwater flows.
   - Establish erosion control and drainage regulations that incorporate best management practices for controlling nonpoint source pollution.
   - Regulations and drainage improvements shall be consistent with the following principles:
     1. Use natural drainageways for storm runoff waterways wherever possible.
     2. Avoid channelization or alteration of natural drainageways.
     3. Avoid diversion of storm runoff from one basin to another.
     4. Do not replace natural drainageways with structured, closed systems, except at road crossings.
     5. Require detention basins in new developments, in order to maintain predonation stormwater flow rates. Requirements shall be based on the two-year storm but may be increased.
     6. To conserve land, develop detention basins in conjunction with park or open lands and design for multiple uses.
     7. Protect buildings from the 100-year flood.
     8. Where there are no downstream drainage systems or if the downstream systems lacks sufficient capacity, require retention facilities sufficient to maintain 100-year storm flows at pre-development rates and conditions.

### 7.8 Solid Waste

A. The following general policies apply to solid waste management on Kaua‘i. Specific policies to guide solid waste programs should be provided in the long-range SWMP.

   - Using long-range integrated resource planning, the County shall manage an islandwide system of solid waste collection, reuse, recycling and disposal that (1) is environmentally sound and cost-effective; (2) increases diversion of waste from the island’s landfill(s); and (3) provides for the timely and orderly expansion of solid waste facilities.
   - Through a multi-faceted program of education, management measures, and financial incentives, the County shall support and stimulate Kaua‘i businesses and residents to reduce their solid waste generation and increase the reuse and recycling of materials.
   - The County shall incorporate entrepreneurial principles in managing solid waste, involve private businesses, and support market-oriented innovations and initiatives. Among other options, the County shall consider opportunities for utilizing the waste stream for energy generation.
Discussion: Hawai’i Dairy Farms supports the County’s policies related to improving Kaua‘i’s public facilities and services, development of pasture will help reduce stormwater runoff and soil erosion through best management practices and improved grass and soil conditions.

8.0 Improving Housing, Parks and Schools

8.1 Housing

A. Following are policies to guide housing and community development programs on Kaua‘i.
   (a) Increase the supply of affordable rental housing, as indicated by market conditions.
   (b) Increase opportunities for moderate- and low-income households to become homeowners. Work from the bottom up, serving the 35 percent of residents whose income is 80 percent of the median or less. The intent is to move families out of expensive rental subsidy programs into homeownership, developing housing at a very low cost through self-help programs and reduced-rate mortgage financing.
   (c) Acquire and bank land and infrastructure improvements for future housing development.
   (d) Support the development of housing and support services for elderly and special needs groups, including persons with disabilities, the homeless, and other at-risk populations needing shelter and rehabilitation programs.
   (e) Reserve the program income from the HOME and CDBG disaster grants to fund housing and community development projects. Use the Housing and Community Development Revolving Fund to finance projects and maintain capital.
   (f) Continue to prepare and adopt a five-year Consolidated Plan and one-year Action Plans, with community participation.
   (g) Continue to partner with for-profit and nonprofit organizations in order to provide the highest level of housing and community development assistance possible.
   (h) Develop a flexible planning process for housing programs that monitors current real estate and socio-economic conditions and allows the County to make timely changes in strategy and resource allocation.
   (i) Develop an Affordable Housing Program to standardize the application and administration of affordable housing requirements within the County of Kaua‘i.

8.2 Parks and Recreation

8.2.3 Policy

A. (a) Develop and maintain Kaua‘i’s parks to meet the needs of the island’s various communities and of both residents and visitors.
   (b) Provide convenient access to all of Kaua‘i’s beaches and inland recreation areas.
   (c) Provide for the safe and secure use of public parks and recreation facilities.
   (d) Give high priority to improving maintenance of grounds and comfort stations.
   (e) Give high priority to acquiring and developing additional beach parks and community or neighborhood parks in communities that are under-served or experiencing growth. Consider community concerns in all planning efforts.
   (f) Provide for flexibility in administering the park dedication requirements, so that developer land dedication or fee payments result in a usable park complete with facilities. Create new parks through County-developer partnerships.

8.3 Education

8.3.1 Policy

A. Since public education is a State responsibility, the County’s role is to support excellence in schools through youth programs and other efforts. The availability of adequate school facilities is a concern that the County must address with the DOE in considering the location of new development.
   (a) Strive for a strong education system which provides Kaua‘i’s children, teens, college students, and adults with the knowledge and skills needed to obtain a well-paying job on Kaua‘i.
   (b) Approve new residential developments only after the State DOE certifies that adequate school facilities, either at existing schools or at new school sites, will be available when the development is completed.
   (c) Have developers pay their fair share of all costs needed to ensure provision of adequate school facilities for the children living in their developments.
Table 5-7 (Elements of the) County of Kauaʻi General Plan

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<tr>
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<th>N/S = Not Supportive</th>
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<td>(d) Consider schools as community resources for learning about specialized environmental, cultural, and historic subjects related to Kauaʻi and each of its communities. Schools should also assume important community functions such as recreational centers, meeting facilities, and emergency shelters.</td>
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**Discussion:** Hawaiʻi Dairy Farms supports the County’s policies related to improving Kauaʻi’s housing, parks, and schools, however, they are not directly applicable to the Proposed Project.

9.0 Implementation

A. Initiating zoning map and development code amendments to conform to the policies of the General Plan X
B. Undertaking planning for infrastructure systems and facilities, parks and housing in order to guide public investment in support of the vision and policies of the General Plan X
C. Recommending approval, approval with modifications or denial of developments seeking zoning or other land use permits, based on their conformance to GP policies and how well they support the vision for Kauaʻi’s development; X
D. Preparing development plans for Kauaʻi’s various communities in collaboration with community coalitions; X
E. Developing indicators and reporting progress on achieving General Plan vision and policies; and X
F. Conducting a comprehensive review of the General Plan every 10 years and recommending revisions as necessary X

**Discussion:** Hawaiʻi Dairy Farms supports the County’s policies related to implementing and reviewing progress on Kauaʻi’s General Plan and related policies, however, these actions are not directly applicable to the Proposed Project.

### 5.11 COUNTY OF KAUAʻI COMPREHENSIVE ZONING ORDINANCE

The purpose of the CZO is to regulate land use in a manner that will encourage development in accordance with the Kauaʻi’s scenic beauty and rural character, and to prevent any inadequate, harmful or disruptive conditions that may be detrimental to the well-being of Kauaʻi residents. The CZO carries out adopted land use policies, including the County of Kauaʻi General Plan and development plans. These standards are applicable to the location, height, bulk and size of structures, yard areas, off-street parking facilities, and open spaces, and the use of structures and land for agriculture, industry, business, residences or other purposes.

The County of Kauaʻi adopted the Comprehensive Zoning Ordinance in September 1, 1972, and is currently updating the CZO in two phases. The first phase will adopt Ordinance No. 935, the newly adopted zoning code for the County of Kauaʻi, and is serving as the official zoning code until the County of Kauaʻi completes the second phase. CZO regulates ag [EXPAND W/OVERVIEW of AG ZONING]; project is in ag; project is in keeping with zoning.
Discussion: The subject property is designated as agriculture by the County of Kaua‘i (Figure 5.12-1). The purpose of the Agricultural district is to both protect and accommodate existing and potential agricultural needs. The zoning designation also serves as a means to limit and control the dispersal of residential and urban use on agriculturally viable lands. Hawai‘i Dairy Farms is consistent with the permitted land uses under the ordinance.

5.12 COUNTY OF KAUA‘I – SPECIAL MANAGEMENT AREA

The Hawai‘i State Coastal Zone Management Program (CZMP) was enacted by Hawai‘i Revised Statutes 205A – Hawai‘i Coastal Zone Management Act (CZMA), as a requirement of the National Coastal Zone Management Program of 1972. The program provides policy guidance for development activities as they relate to coastal land and water resources. The entire land area of the State of Hawai‘i has been determined to be within the Coastal Zone as defined by the CZMA.

The Special Management Area (SMA) permitting system is part of the CZM Program approved by Federal and State agencies. When CZM, first became law in 1975, the legislature established the SMA regulatory function at the county level, and the Kaua‘i Planning Commission is the authoritative agency in the County of Kaua‘i. Based on SMA maps of the region, the site area is located outside the Special Management Area (SMA) (Figure 5.13-1).
Figure 5.12-1  Special Management Area in Vicinity
5.13 COUNTY OF KAUA’I – SOUTH KAUA’I COMMUNITY PLAN

The previous regional planning document, the 1978 Kōloa-Po’ipū-Kalahea Development Plan, was adopted by the County Council in 1983. This has since been replaced by the 2015 South Kaua’i Community Plan (SKCP 2015). The 2015 SKCP serves to update and supersede the maps and land use policies found in the previous development plan.

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<tr>
<th>Table 5-8 County of Kaua’i – Kaua’i South Community Plan</th>
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<td>The South Kaua’i Community Plan released in July 2015 updated maps and land use policies for the region. The guiding principles of the plan are:</td>
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<tr>
<td>1) Watershed Management</td>
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<td>2) Cultural Stewardship and Interpretation</td>
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<td>3) Hazard and climate Risk Management</td>
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<td>4) Compact Walkable Neighborhoods</td>
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<td>5) Multi-modal Transportation System</td>
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<td>6) Sustainable Resorts and Tourism</td>
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<td>7) Economic Development Opportunities</td>
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<td>8) Diversity of Housing Types</td>
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<tr>
<td>9) Public Infrastructure and Facilities</td>
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**Discussion:** The County of Kaua’i South Kaua’i Community Plan serves to guide development in the southern Kōloa-Po’ipū-Kalahea-‘Oma’o-Lawai’ region of Kaua’i, and the policies are reflected in the Community Plan Land Use Map (Figure 5-13.1). Watersheds will be protected through sustainable practices in accordance with county, state, and federal guidelines, cultural resources will be identified and protected per HRS Chapter 6E Historic Preservation requirements. The agricultural use of the dairy project is consistent with the agricultural designation per the South Kaua’i Community Plan Land Use Map, and will continue Kaua’i’s longstanding policy of preserving agricultural lands as a valuable resource base.

![Figure 5.13-1 County of Kaua’i Development Plan Map (2012)](image-url)
6.0

ALTERNATIVES TO THE PROPOSED ACTION
60 ALTERNATIVES TO THE PROPOSED ACTION

6.1 Alternatives Analysis Overview ................................................................. 6-1
6.2 Alternatives Considered & Eliminated .................................................... 6-2
6.3 No Action Alternative .............................................................................. 6-8
6.4 Conventional Feedlot Dairy Alternative .................................................. 6-8
6.5 Alternative Location for Pasture-Based Dairy .......................................... 6-12
6.6 Milk Processing Alternative by HDF ....................................................... 6-15
6.7 Summary Comparison of Alternatives .................................................... 6-16

6.1 ALTERNATIVES ANALYSIS OVERVIEW

This chapter evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four alternatives that do not meet the project purpose are discussed. Two of those alternatives would not be viable given existing zoning and private land tenure: rezoning the land for resort or residential development; or a potential conservation condemnation. These two uses are examined and eliminated from analysis. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include an Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives are examined but eliminated from further analysis, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.
6.2 ALTERNATIVES CONSIDERED AND ELIMINATED

Among the possible land uses which were considered in the initial alternatives analysis, several options would not meet the project purpose for Hawai‘i Dairy Farms. Two potential options would be rezoning the land for resort or residential development, or condemnation to establish a conservation area. These options would not be reasonably viable given the existing private land tenure and existing zoning, as discussed in Section 6.2.1.

Two additional alternatives were considered in Section 6.2.2 as reasonable land uses that could potentially be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and Agricultural Subdivision Development. These alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

6.2.1 NON-VIABLE ALTERNATIVES

Two alternative land uses considered but discarded from further analysis in this EIS include those that are not viable given private land tenure and zoning: a) land development for resort or residential, requiring rezoning; and b) conservation condemnation. A brief description of these alternatives eliminated from further analysis in this EIS follows:

a. Non-Viable Alternative: Rezoning Land for Resort or Residential Development

Under Hawai‘i’s land use law (Hawai‘i Revised Statutes Chapter 205), permissible uses are defined within the various use districts. Development for resort or residential zoning on Agricultural lands would require rezoning. Important Agricultural Lands have further restrictions from rezoning for other uses. The County of Kaua‘i directs land use through its General Plan and Communities Plans; the designation for the Māhāʻulepū Valley region is Agriculture, with growth areas identified elsewhere on the island. For these reasons, development for resort or residential is not considered a reasonable alternative for this EIS, and is eliminated from further analysis.

b. Non-Viable Alternative: Conservation Condemnation

Legislative efforts supported by facets of the community have previously suggested that government create a state or national park in the Māhāʻulepū region for conservation and public uses in perpetuity. The process whereby government could take private lands is referred to as condemnation, which can occur when a local, state, or federal government seizes private property and compensates the owner. The power of the government to do this is called eminent domain, which essentially means the government takes private property for public use. With the subject HDF site on Māhāʻulepū farm lands, the public condemnation of the 557 acres of Important Agricultural Land could eliminate the potential future use for crop production or livestock farm use. This action would be contrary to the stated policies of the State of Hawai‘i and County of Kaua‘i which designate this land for long-term food production to sustain the people of Kaua‘i.
6.2.2 AGRICULTURAL PARK AND PROCESSING CENTER ALTERNATIVE

The Agricultural Park Alternative would convert this agricultural property into active crop cultivation for one or several crops, including the development and operation of an agricultural products processing center.

Grove Farm created Mahaulepu Farm, LLC, to enact a long-term vision for Māhāʻulepū Agricultural Valley as a flagship sustainable agricultural area. The intention of the initiative has been to “grow what Kauaʻi eats”. Mahaulepu Farm has planned an agricultural valley that encompasses about 800 acres of food crops. Portions of the Māhāʻulepū lands are currently in use for taro cultivation, fruit trees, small crops, ranching and formerly, seed cultivation. The proposal for a pasture-based dairy (proposed action) would be consistent with the landowner’s and County’s vision for local food production, as would be the alternative for the cultivation of food crops.

Grove Farm has explored the feasibility of growing a variety of produce crops at Māhāʻulepū for local consumption. The long-range plan called for about 300 acres at Māhāʻulepū to be used to grow taro, with the rest of the valley to be dedicated to raising other edible produce. For years, Grove Farm has worked with the University of Hawaiʻi and consultants to pursue an implementation plan. Operations established through the agricultural park offering include Haraguchi Taro Farms, a banana farm and beef cattle grazing.

Apart from the past efforts of the landowner to pursue this approach without success, the Agricultural Park Alternative is examined as a future option. With the Important Agricultural Lands designation, and the existing soils ratings and rainfall conditions, these lands pose some potential suitability to raise a variety of food crops. It would be expected that the Agricultural Park would focus on truck crops with commercial viability. As a farming business, this could be organized under a single business entity or possibly arranged as an agricultural business cooperative. It is recognized that there are many variable and requirements involved with agribusiness development (e.g. land tenure/lease, irrigation water supply, irrigation systems, soil conditions, crop growth, field management, products processing, markets/shipping). The potential details for the agribusiness structure and finance are not evaluated herein. Each of these factors must be satisfied to establish a viable long-term farming venture.

The Agricultural Park and Processing Center Alternative would involve intensive cultivation. Approximately 557 acres could be divided into multiple farming operations, which would share in the development and operation of an Agricultural Processing Center. The Agricultural Park operations could follow examples set by the larger produce farms in the state. Farms operating in ‘Ewa and Central Oʻahu currently raise a range of produce crops, including: green onions, pak choy, choy sum, kai choy, daikon, radish, zucchini, won bok (Chinese cabbage), apple banana, herbs (mint, basil, chives, chinese parsley, lemon grass), sweet onion, eggplant (long), Japanese cucumber, long beans, string beans, paria leaf (bitter melon leaf), camote leaf (potato leaf), head cabbage, cantaloupe, honeydew, sunburst, broccoli, sweet corn, pumpkin, squash and watermelon. It is not known which truck crops could be successfully cultivated at the Māhāʻulepū location. This would require field trials to prove the actual growing conditions to cultivate produce crops at a commercially viable scale.

In support of the Agricultural Park crop production and marketing, an on-site agricultural products processing facility would be developed to serve as the center for the farm operations. The facility would provide sorting, cleaning, washing, packaging, storage, refrigeration and transshipment of
the agricultural products. Development of a 15,000- to 20,000-square foot Packaging Facility would include office space, supply rooms, equipment maintenance shop, backup power generator, restrooms, equipment yard and worker parking.

**Anticipated Environmental Impacts - Agricultural Park and Processing Center Alternative**

Although this alternative scenario would not meet the project purpose, a summary of anticipated environmental impacts is provided.

Intensive cultivation operations of an Agricultural Park would require a conservation plan utilizing Natural Resources Conservation Service technical guidance to document farm-wide objectives and define best management practices. Depending upon the extent of site-specific operational controls, the possibility of bare and tilled soils from intensive cultivation could lead to soil loss and resulting surface water quality impacts consistent. Even with efforts to protect soils with ground cover and runoff control, erosion of farmland soils commonly occurs from large agricultural lands on Kaua‘i. Surface water quality would be degraded through fertilizers and pesticide constituents in stormwater runoff. Depending upon surface water quality effects, there could be measurable downstream effects to ocean water quality in the nearshore area.

The Agricultural Park and Processing Center Alternative would not be anticipated to generate adverse impacts to climate, topography, groundwater, land use, views, flora and fauna species, natural hazards and public services. There would be no adverse effect upon archaeology or cultural resources, with no affect to resources within the farm limits.

With the Agricultural Park and Processing Facility Alternative, there would be some limited effect on roadways and traffic, noise, air quality, hazardous materials, and agricultural infrastructure. Trucks and worker vehicles would access the agricultural park each day, along with shipments of agricultural products and farming supplies. These vehicles would generate noise along local area roadways, and cause dust generation along the farm roadways. Use of hazardous materials would occur, primarily fuels and lubricants for farm equipment and required agricultural chemicals (pesticides, herbicides, fungicides).

The Agricultural Park and Processing Facility Alternative would include farm worker employment for field and processing facility operations. Use of these lands for agricultural cultivation crops would generate lease rent of $300/acre/year for the landowner. Depending upon the types of crops raised, extent of on-site processing and markets for products, the farm could generate over $150,000/year in gross lease rent. The Agricultural Park operations would produce modest positive economic effects through employment, expenditures and State and County tax revenues.

There would be limited substantial cumulative or secondary effects associated with the Agricultural Park and Processing Facility Alternative, potentially long term cumulative surface water effects from suspended soils and farming chemicals in storm water runoff. No irreversible or irretrievable commitments of resources would be anticipated.

**Conclusion of Alternative Evaluation.** This alternative does not meet the purpose and need of the proposed action. The alternative does not fulfill the need for a new agricultural model, and does not provide a critical source of protein for the people of Hawai‘i who are vulnerable to supply disruption. This alternative was not advanced for further evaluation.
6.2.3 AGRICULTURAL SUBDIVISION

The Agricultural Subdivision Alternative would involve the development of land that is currently designated by the land owner and County as IAL. To develop an agricultural subdivision, action would be required to rescind the IAL designation with applicable County real property tax implications. This action would clearly contradict the intention of Grove Farm in its prior initiative to designate the land into long-term productive agricultural function, and the potential to abandon the conversion to urban land classification or subdivision for farm dwellings. For the purpose of this evaluation of alternatives, the creation of an Agricultural Subdivision was assessed.

The County of Kaua‘i Comprehensive Zoning Code (CZO) (Ord 935) specifies allowed uses of Agricultural zoned land, as outlined below for the purpose of calculating the number of agricultural lots and residential densities. Provisions under Sec. 8-8.2 Agricultural District Development Standards state the permitted residential densities shall be calculated as follows:

1. One (1) dwelling unit for each parcel one (1) acre or larger.
2. One (1) additional dwelling unit for each additional three (3) acres in the same parcel, provided that no more than five (5) dwelling units may be developed on any one (1) parcel.

Provisions under Sec. 8-8.3 Limitations on Subdivisions of Parcels in Agricultural Districts states that contiguous lots or parcels of record in common ownership existing prior to or on September 1, 1972, larger than three hundred (300) acres, may be subdivided only in accordance with the following criteria:

A. a maximum of seventy-five (75) acres may be subdivided into not more than ten (10) parcels, none of which shall be smaller than five (5) acres.

B. an additional twenty percent (20 percent) of the total parcel area or three hundred (300) acres, whichever is less, may be subdivided into parcels, none of which shall be smaller than twenty five (25) acres.

Following the County of Kaua‘i CZO allowances, the potential development of the 557-acre site into an Agricultural Subdivision would be calculated as follows:

- 75 acres: Five parcels of 15 acres, yielding 5 homes per parcel, with 25 homes total.
- 111 acres: Four parcels of minimum 25 acres, with 5 homes per parcel, 20 homes total.
- 371 acres: Agricultural land (either integrated with large parcels or separate farm area).

The CZO would allow for the development of a total of 45 homes (farm dwellings) under the Agricultural Subdivision Alternative. Each home would be required have agricultural operations within the property to generate revenue to the occupant of the farm dwelling. It is estimated that roughly 45 acres would be dedicated to the farm dwellings and surrounding accessory uses, another 12 acres dedicated to roadways and drainage, and approximately 371 acres of active agriculture and a central processing facility would be developed. The individual farm lots would also develop agricultural uses on their lands, such as grazing, fruit trees, or intensive cultivation. The farming operations could be conducted on individual lots, or potentially organized under a common farming management entity for uniform crop production across agricultural production zones on each lot, served by a centralized farm processing operation. An overall agricultural plan would be formulated, requiring review and approval by the State of Hawai‘i Department of Agriculture and County Planning Commission.
With the agricultural subdivision alternative there would be substantial needs for supporting infrastructure such as access roadways, potable water supply, fire protection, defined drainage courses, and agricultural support areas/buildings. Individual wastewater systems (septic tank, infiltration disposal field) would be allowed for these homes. Since the development would be approximately 45 homes, this could necessarily trigger the need for a consolidated wastewater treatment system and injection well or irrigation disposal system, along with HRS Chapter 343 compliance for EA/EIS preparation and supporting technical studies. With no consolidated treatment and disposal facility, the 45 homes would necessarily be serviced with on-site individual wastewater systems, pending DOH consent.

**Anticipated Environmental Impacts - Agricultural Subdivision Alternative**

Although this alternative scenario would not meet the project purpose, a summary of anticipated environmental impacts is provided.

With the development of 45 farm dwellings there would be short-term impacts associated with the construction phase of the agricultural subdivision alternative. The short-term impacts would include effects due to soil disturbance, runoff and erosion, dust generation, construction noise, worker vehicles and truck traffic, and vehicle and truck emissions. Development of the internal roadways and support infrastructure (e.g. drainage system, water supply, sewers, electrical and communications) would be substantial to serve the 45 house lots. The individual farm lots would also develop agricultural uses across the majority of their lands, with potential for grazing, fruit trees, and intensive cultivation. There would be construction phase mitigation, such as NPDES construction best management practices, required to limit site development impacts. The construction phase employment associated with the development of the 45 homes would benefit Kaua‘i construction workers. Associated equipment and materials purchases would also generate business sales and State tax revenues.

Over the long term, there would be potential long-term impacts associated with operations of the agricultural subdivision alternative. The occupants of the subdivision would generate the traditional types of impacts associated with a low density 45-home agricultural lot development. Water use for domestic and agricultural purposes would be significant. Potable water use is estimated at 500 gallons per day (gpd) per residential unit, with a total daily demand of 22,500 gpd. Depending upon the type of crops, the 371 acres of farmland would require agricultural irrigation of 2,000 to 3,000 gpd per acre, totaling 742,000 to 1.1 million gpd. Wastewater generation from the subdivision would be substantial, estimated at roughly 500 gpd per unit or 22,500 gpd. Individual wastewater systems (IWS) may not be approved as the site, which would require construction of an onsite sewage collection system and conveyance to a consolidated wastewater treatment facility for treatment and disposal. Disposal from the wastewater treatment plant would be comparable to the over 100 private wastewater injection wells associated with small package plants serving the residential, commercial and resort areas in the Kōloa and Po‘ipū communities. Alternatively, it is possible that agricultural irrigation reuse of treated effluent could be pursued for application on certain agricultural crops, with required 30-day effluent storage ponds and back-up effluent injection disposal during prolonged rainy weather periods. The agricultural subdivision could create measurable downstream effects to surface water and nearshore ocean water quality.

Archaeological resources on the site consist of historic agricultural structures (culverts, bridges, and retaining wall). Archaeological resources identified within 1,000 meters of the site’s northern boundary include two pre-Contact sites that may have been used for ceremonial purposes: an
enclosure; and boulders with petroglyphs. The archaeological resources could be altered or removed with the development of drainage system for the 45-unit agricultural subdivision. The residential use would bring people to the foot of the Hāʻupu slopes and ridges, allowing more access to hikers and hunters and thereby creating a potential for adverse effects to these sensitive sites surrounding the potential development. The nearby coastal area would likely receive more pressure on fishing and resource gathering.

Additional employees for the agricultural subdivision would generate additional worker vehicle trips and truck trips on local roadways. It is estimated that 5 to 10 employees could be involved in the new farming operations at the agricultural subdivision, on individual farm leases or larger scale common area farms. Farm supplies and product shipments from the agricultural subdivision would involve daily deliveries and truck trips. Vehicle noise and air emissions would increase due to the added vehicle and trip trips on local roadways.

Approximately 135 to 180 people would live in the new agricultural subdivision. Residents would travel on local roadways to reach places of employment, shopping, schools and recreational activities. Traffic associated with the 45 agricultural subdivision homes would add a significant number of vehicles on local roadways. It is estimated that up to 68 to 90 peak period vehicle trips could be generated from residents and workers associated with the agricultural subdivision. Most residents of the agricultural subdivision would not be farmers, and they would travel to and from employment locations in Po'ipū, Kōloa and Līhuʻe.

It is estimated that between 45 to 68 school-aged children would live at the agricultural subdivision, placing a new demand on local area public school facilities, libraries and park facilities. The agricultural subdivision would place new demands on County public services such as fire protection, police protection, and emergency medical services. The County of Kauaʻi would need to make provisions to serve this new subdivision development, with offsetting fee contributions from the subdivision developer.

The agricultural subdivision will require substantial electricity use for the 45 homes and agricultural processing operation. This energy demand could be partially offset by on-site solar energy generation by individual homeowners. The agricultural subdivision would require the extension of additional 12 kV power supply, and possibly offsite electrical system upgrades to the Kauaʻi Island Utility Cooperative (KIUC) system serving the Kōloa-Poʻipū area. Roads and home will create impermeable surfaces; utility corridors will require trenching. Improvements will result in irreversible impacts to topography and soils, and add to stormwater runoff in the area.

It is estimated that 5 to 10 new permanent jobs would be created with the operation of the agricultural subdivision farms and processing facilities. State tax revenues would be increased through employment income taxes and sales taxes on products. County real property tax revenues would be increased through higher property value assessment with the 45 homes and lands within the agricultural subdivision. Local businesses in Kōloa and Poʻipū would benefit from the purchasing activity of the residents living in this agricultural subdivision.

**Conclusion of Alternative Evaluation:** This alternative does not meet the purpose and need of the proposed action, as it does not provide support for a unique underrepresented industry like dairy which is overly imported in the state of Hawaiʻi. This alternative did not advance for additional evaluation alternative.
6.3 NO ACTION ALTERNATIVE

The No-Action Alternative would continue future use of agricultural property without the establishment of the sustainable pasture-based dairy operations. With the Important Agricultural Lands designation, this land would be expected to be used for either grazing or cultivation. Use of these lands for cattle or sheep grazing pasture could be reestablished, with cattle and/or sheep grazing on the 500+ acre pasture area. At the stocking rate of two to four animals per acre, common to Kaua‘i grazing lands, the total number of cattle and sheep grazing on the land could potentially range up to 2,000 animals.

Anticipated Environmental Impacts – No-Action Alternative

With a traditional grazing operation in the No-Action Alternative, no special provisions would be required for managing cover crops and runoff. Soil loss and surface water quality impacts would be consistent with other animal grazing operations on Kaua‘i. With no site-specific operational controls, the grazing lease operations would be covered under the existing agricultural conservation plan applicable to the broad suite of agricultural uses on Grove Farm lands at Māhā‘ulepū. Without mitigation and controls, surface water quality could be degraded through storm runoff of animal waste and suspended sediment.

The No-Action Alternative would not be anticipated to generate adverse impacts to climate, topography, groundwater, land use, views, flora and fauna species, natural hazards, roadways and traffic, noise, hazardous materials, agricultural infrastructure, and public services. There would be no adverse effect upon archaeology or cultural resources, unless the grazing operation fails to maintain fences and gates to contain animals.

The No-Action Alternative would include limited employment through the agricultural economic activity. Use of these lands for cattle or sheep grazing pasture would likely be reestablished at the estimated rate of $100/acre/year. The total area within the 557 acres could be leased for cattle or sheep grazing by a Kaua‘i livestock operation. The limited grazing revenues could restrict the amount of operational program manpower and implementation of farm environmental controls. The grazing operations would add limited economic benefits to State and County revenues.

There would be limited substantial cumulative or secondary effects associated with the No-Action Alternative. Potential long-term effects to surface waters from periodic storm water runoff would continue to allow suspended soils and animal waste into the ditch system. No irreversible or irretrievable commitments of resources would be anticipated.

Conclusion of Alternative Evaluation: This alternative does not meet the purpose and need of the proposed action. No support for a unique, underrepresented agricultural industry would occur; no advancement of food sustainability for the state would occur. This alternative was not advanced for further evaluation.

6.4 CONVENTIONAL FEEDLOT DAIRY ALTERNATIVE

The development and operation of a conventional feedlot dairy would potentially achieve the project purpose to increase local milk production. This alternative would utilize the conventional methods for a large-scale commercial dairy in which milking cows are confined in large all-weather barn facilities, without access to forage and without pastures.
The conventional feedlot dairy alternative would utilize large barns to house and feed the dairy cows. A total of either 699 or 2,000 dairy cows would be confined within several large barns. There would be no pasture area utilized in this alternative. The dairy farm complex would occupy a land area of approximately 20 acres, with dairy facilities consisting of several large barns, milking parlor, storage buildings and waste storage lagoons.

With the conventional feedlot alternative, pasture grass would not be utilized as a locally available feed source. Grain and forages would be imported as the primary feed source to sustain dairy cows, at significant additional cost to the dairy operation. Cows would be fed in barns, where they are housed 24 hours each day without natural light and air. Individual animals would be rotated through the milking parlor during twice-daily milking. The requirement to supply imported feed would be significant, estimated at 8 to 10 tons per day for a herd of 699, and 25 to 30 tons per day for a herd of 2,000 mature dairy cows. History showed the decline of Hawai‘i’s dairy industry and eventual demise was largely due to the escalating cost of feed imported from the mainland U.S. Ideally, the portion of feed consisting of forage could be grown locally.

The alternative for a conventional feedlot at the Māhā‘ulepū location would require a program for manure management that collects all manure produced by cows confined within the dairy facilities for 24 hours each day. Potable water would be required to adequately wash down the milking parlor and walkways to maintain animal health. Approximately 30,000 gpd of wash down water would be managed with the manure.

Manure management for a conventional feedlot operation would involve manure collection, transfer and long-term storage in lagoon ponds for evaporation and oxidation breakdown. A scraper system would collect all manure within the cow barns. This material will be the transferred to a lagoon where the parlor wash-down water and cow barn material are mixed. The blended material would be mechanically separated to provide of dry matter that can be dried again and re-used as bedding for the cows. The waste laden water is then captured in a storage pond where it could be managed for irrigation to row crops for silage that could be grown on surrounding lands.

The area and volume of the storage ponds would be sized to allow for the estimated 60,000 gpd for the 2,000 cow dairy. The storage ponds would be three to four times the size of the storage ponds for a pasture-based dairy. Storage ponds would also require sizing to retain rainfall during storm events, which would further expand the volume of waste laden water at the dairy. This alternative would entail significant risk in terms of not being able to comply with waste pond overflow potential.

With the conventional feedlot alternative, manure nutrients would not be returned to pastures through a managed irrigation program intended to balance soils function and pasture grass uptake of the majority of nutrients. Effluent from the waste ponds would be applied daily to nearby crop producing acres. The resultant increased quantities of effluent would require nearly constant disposal in the pasture/fields, as the effluent nutrients would not be managed in a precise manner focused on the optimal growth of pasture grass for forage. This would be a concentrated disposal program that would maximize the application quantities and potentially exceed the nutrient requirements of the surrounding soils.
Anticipated Environmental Impacts – Conventional Feedlot Alternative

Table 6.4-1  Comparison of Rotational-grazing Pasture versus Feedlot Dairy
At Committed Herd Size (699 mature dairy cows)

<table>
<thead>
<tr>
<th>Type of Dairy</th>
<th>Required Building Facility area (square feet)</th>
<th>Feed required for cows (lbs/day)</th>
<th>Wash water requirement (gal/day)</th>
<th>Waste production (gal/day)</th>
<th>Waste Storage (gal)</th>
<th>Waste Storage (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasture-based (5 employees)</td>
<td>22,580</td>
<td>9,000</td>
<td>12,165</td>
<td>1,000</td>
<td>2.1m</td>
<td>215’ x 130’ x 17’</td>
</tr>
<tr>
<td>Conventional feedlot (9 employees)</td>
<td>77,650</td>
<td>36,000</td>
<td>12,165</td>
<td>20,970</td>
<td>4.5m</td>
<td>180’ x 360’ x 14’</td>
</tr>
</tbody>
</table>

Table 6.4-2  Comparison of Rotational-grazing Pasture versus Feedlot Dairy
At Contemplated Herd Size (2,000 mature milking cows)

<table>
<thead>
<tr>
<th>Type of Dairy</th>
<th>Required Building Facility area (square feet)</th>
<th>Feed required for cows (lbs/day)</th>
<th>Wash water requirement (gal/day)</th>
<th>Waste production (gal/day)</th>
<th>Waste Storage (gallons)</th>
<th>Waste Storage (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasture-based (5 employees)</td>
<td>22,580</td>
<td>26,000</td>
<td>34,800</td>
<td>3,000</td>
<td>2.1m</td>
<td>215’ x 130’ x 17’</td>
</tr>
<tr>
<td>Conventional feedlot (12 employees)</td>
<td>229,224</td>
<td>104,000</td>
<td>34,800</td>
<td>60,000</td>
<td>14m</td>
<td>240’ x 760’ x 14’</td>
</tr>
</tbody>
</table>

The conventional feedlot operation would generate short-term impacts associated with the construction phase development. There would be soil disturbance, runoff and erosion, dust generation, construction noise, worker vehicles and truck traffic, and vehicle and truck emissions. Construction phase employment would benefit Kaua‘i workers, and equipment and materials purchases would generate local sales and State tax revenues. There would be construction phase mitigation required to limit impacts.

There would be potential long-term impacts associated with operations of the conventional feedlot alternative. Due to the higher density of animals in the barn area and no pasture area, the conventional feedlot alternative collects 100 percent of manure generated. Manure is eventually dried and used as bedding for cows, which generates particulate matter. Manure storage lagoons typically contain waste for roughly 6 months, which fosters off-gassing and contributes to greenhouse gases. Should digesters be used to generate electricity from the gases, the potential exists for unexpected releases of the accumulation of noxious chemicals within the structure.
The concentration of animal waste would pose the potential for increases in populations of vector insects such as flies occurring with the conventional feedlot alternative. Natural fly predators such as dung beetles, cattle egrets, and dragonflies exist in a balanced predator-prey cycle. Populations of arthropods that prey on fly larvae and disrupt the fly life-cycle require soils as habitat. In the barn setting where manure accumulates on impermeable surfaces until it is either washed from the milking parlor or scraped from the barns for transport to lagoons for storage, integrated pest management is not an option.

Conventional feedlots provide silage as feed and forage. Silage is fermented, high-moisture stored fodder made from grasscrops, including maize, sorghum or other cereals. Silage can be made from many field crops using the entire green plant (not just the grain). The fermentation is done on-site, by placing cut green vegetation into a silo or pit, or compressing it with heavy machinery. The pile is then covered with a plastic sheet or baled and wrapped in plastic film until the fermentation process renders the material palatable and digestible by cows. Managing moisture is essential to controlling odor; various odor descriptors can be used to help the dairy operator determine corrective action for the fermentation mix. The odor descriptors include: like ethanol or vinegar; rancid and fishy; or moldy and musty.

Additional odors from the larger manure storage lagoons would be another impact of a conventional feedlot dairy. The lagoons would be sized to hold six months of manure produced; the surface area of the lagoon is significantly greater than that required for the pasture-based dairy which cycles effluent through and re-applies it with irrigation to provide nutrients to the grass.

With the conventional feedlot operation, historical, archaeological and cultural resources would not be affected. Employees for the conventional feedlot alternative operation would generate additional worker vehicle trips and truck trips on local roadways. It is estimated that three to four additional employees would be added to the facility. Feed shipments for the dairy would involve daily truck trips to Līhu‘e, along with fluid milk delivery to processing on Kaua‘i or elsewhere in the state. Vehicle noise and air emissions would increase due to the added vehicle trips on local roadways.

The conventional feedlot operation facilities will require substantial electricity use for ventilation and lighting. Barns are designed for space efficiency with cows in close quarters but allowing room to lie down, as rest is important for a cow to digest its food. Spray misters are often used with fans to provide cooling. Estimates of electrical demand range between 800 and 1200 kWh per cow per year would only be partially offset by the operation of additional on-site solar energy generation. Solar energy collection with photovoltaic panels generating a total capacity of approximately 500 kW would be installed across the roof of the facility, and tied into the overall on-site energy generating system.

There would be an addition of three to four permanent jobs with the operation of the conventional feedlot operation. State tax revenues would be increased through employment and sales taxes. County real property tax revenues would increase with the property value assessment.
6.5 ALTERNATIVE LOCATION FOR THE PASTURE-BASED DAIRY

The Hawai‘i Dairy Farms project emerged from a group of partners and affiliates, including Grove Farm, Finistere Ventures, Kamehameha Schools, Maui Land & Pineapple and Ulupono Initiative. The group conducted grass trials statewide to determine the best site for a rotational-grazing pasture based dairy. Kaua‘i was found to be the optimal location, as it met all the operational requirements for pasture-based dairy:

- Relatively flat, contiguous acres to move cows with minimal stress,
- Soils suitable to efficiently utilize applied nutrients for growth of forage,
- Adequate water for irrigation and operations,
- Suitable climate conditions for animals and grass growth,
- Agricultural-zoned land available for 20 years or more of sufficient acreage to support an economically viable dairy, preferably IAL, and
- Access to required operational support elements (trucking, pasteurization, work force, etc.).

Grove Farm land holdings on Kaua‘i total nearly 33,000 acres, much of which comprise the lands controlled by the former Lihue Plantation Company and Amfac Sugar Kaua‘i operation, which closed in 2000. Nearly half of these lands are designated as State Conservation District, and the remainder is mostly designated as State Agricultural District. Roughly 550 acres are designated as State Urban District in portions of Hanama‘ulu and Līhue town. Over 12,500 acres were classified by the State and County as IAL, placing them into a committed status for long term agricultural purposes. According to the State of Hawai‘i Department of Agriculture, the South Shore of Kaua‘i features some of the state’s most productive farmland due to high sugar yields as a result of steady sunshine and ample fresh water (DOA, 2016).

The high-level evaluation of Grove Farm holdings applying screening criteria to potential lands resulted in a number of findings:

- Conservation District lands and Urban lands owned by Grove Farm could not be considered for the pasture-based dairy due to inappropriate zoning/land use compatibility.
- Long-term farming leases already exist across major portions of the Grove Farm agricultural holdings, along with investments (e.g. crops, livestock, improvements and facilities).
- Inland mauka agricultural lands receive high annual rainfall and lower incident sunlight, with suboptimal pasture grass growing conditions.
- Agricultural lands mauka of Kūhiō Highway and Kaumuali‘i Highway generally have steep slopes, non-contiguous areas and some rocky soils, which are all factors affecting animal stress.
- Irrigation water availability varies due to proximity to existing reservoirs and wells.
- Areas up-gradient of established County and private wells for drinking water supply could not be considered.
- Unavailable or inadequate support infrastructure at mauka locations.

An alternative location for the pasture-based dairy was considered on approximately 972 acres of agricultural land at Kīpū, including a portion of area located in Conservation District Land. The alternative dairy site location is shown in Figure 6.5-1, and analyzed further in this section.

During the scoping for this EIS, the former Meadow Gold dairy site at Moloa‘a has been suggested as an alternate location. The dairy was a conventional confined dairy with 460 dairy cows on 170 acres of land. The site does not meet the criteria for a rotational-grazing pasture based dairy.
The alternative location would potentially satisfy some of the evaluation criteria in terms of slopes, land tenure, soils, micro-climate, water supply and support infrastructure.

Under the four comparative evaluation criteria for site screening identification, the alternative site would provide less suitable properties for pasture-based dairy than the Māhā’ulepū site. Comparative information under key evaluation criteria is summarized below:

- **Slope:** The Kīpū site contains greater slope conditions, with over 10 percent of site containing 5-10 percent slopes, as compared to generally level conditions at the Māhā’ulepū site.
- **Rainfall:** The Kīpū site has higher rainfall, with 65-80 inches per year, as compared to 50-65 inches per year at the Māhā’ulepū site.
- **Sunlight:** Kīpū has lower incident sunlight with an average of 184.77 watts per square meter (w/sm) compared to 196.6 w/sm at the Māhā’ulepū site (U.H. Manoa, 2015).
- **Land Classification:** Roughly 26 percent of the Kīpū site is classified as State Conservation District with the remainder classified State Agricultural District.
- **IAL Designation:** The Kīpū site is not classified as IAL.
- **Sensitive Habitat:** The perennial Hulē’ia Stream running through the site, which eventually drains through the Hulē’ia National Wildlife Refuge.

Of note, Hulē’ia Stream has experienced pollution in the past. The State of Hawaiʻi approved total maximum daily load limits (TMDLs) on the stream in 2008, including limits for enterococci, turbidity, and Total Suspended Solids (DOH, 2014).
Comparative statistics are shown below for the proposed HDF site and alternative site.

Table 6.5-1 Comparison of Mahaulepu Valley Site and Alternative Kauai Location

<table>
<thead>
<tr>
<th>Pastoral Rotational-Grazing Dairy Operational Requirements</th>
<th>Māhāʻulepū Valley</th>
<th>Alternative Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of Dairy Farm</td>
<td>557 ac</td>
<td>730 ac (include Conserv. Land)</td>
</tr>
<tr>
<td>Projected Herd Size</td>
<td>699 up to 2,000</td>
<td>2,400</td>
</tr>
<tr>
<td>Annual Milk Production Goal</td>
<td>1.2 MG</td>
<td>2.5 MG</td>
</tr>
<tr>
<td>Relatively flat, contiguous acres to move cows with minimal stress</td>
<td>Mostly 0-5% Slopes Generally Level</td>
<td>0-5% Slopes Sections of 5-10% Slope</td>
</tr>
<tr>
<td>Soils suitable to efficiently utilize applied nutrients for growth of forage</td>
<td>Overall “B” rated Land Study Bureau Classification 1</td>
<td>Mainly “D” rated Land Study Bureau classification, some pockets of “C” 1</td>
</tr>
<tr>
<td>Adequate water for irrigation and operations</td>
<td>2.93 MGD (Irrigation), Waita Reservoir &amp; existing wells</td>
<td>3.80 MGD (Irrigation), Halenanahu Reservoir</td>
</tr>
<tr>
<td>Agricultural-zoned land available for 20+ years, sufficient area to support an economically viable dairy and preferably IAL</td>
<td>25 Yr Lease 557 acres usable IAL Designated</td>
<td>Not available for purchase No 25 Yr Lease ~600 acres usable Not IAL Designated</td>
</tr>
<tr>
<td>Access to required operational support elements (truck, work force)</td>
<td>Existing private agriculture haul roads on site, improved to meet NRCS code guidelines</td>
<td>Existing private agricultural roads, crushed gravel interior roads, all weather asphalt - vehicles</td>
</tr>
</tbody>
</table>

1 Grades “A” through “E” and “U” per HRS Chapter 205 – The State Land Use Law

Anticipated Environmental Impacts – Alternative Location

Pasture-based dairy development at the alternative location poses the potential for short-term impacts associated with the construction phase. There would be soil disturbance, runoff and erosion, dust generation, construction noise, worker vehicles and truck traffic, and vehicle and truck emissions. Construction phase employment would benefit Kaua‘i workers, and equipment and materials purchases would generate local sales and State tax revenues. There would be construction phase mitigation required to limit impacts.

Slope conditions at the alternative dairy location would warrant limited site disturbance and soil erosion controls. Specific measures would be required to avoid erosion and sediment runoff entering the perennial flowing waters of Hulē‘ia Stream, which discharges downstream in the Hulē‘ia National Wildlife Refuge and Nawiliwili Bay.

There would be potential long-term impacts associated with operations of the pasture-based dairy. Due to higher rainfall and lower incident sunlight, field trials indicated lower growth rates for the pasture grasses as compared to the Māhāʻulepū site. To provide the same level of forage grass crop for the dairy cows, it would require a larger 300 acre pasture area requirement to support the 2,400 cow dairy for pasture operations, including effluent irrigation.

The design of the waste pond would accommodate the wash water contributed to the waste pond on a daily basis. High annual rainfall at this location would limit the ability to irrigate pasture grass during the wet season, requiring greater waste pond storage retention. Dairy irrigation operation would reuse the diluted effluent accumulated in the waste pond, with no anticipated adverse effects to ground water or surface water quality.
If managed properly, there would be no adverse odors generated by the dairy operations. Archaeological and cultural resources would be protected in a manner similar to the pasture-based dairy. There are cultural resources located along the hillside areas of the alternative dairy property, and historical agricultural features located within the dairy pasture areas.

Employees for the dairy operation would generate worker vehicle trips and truck trips on local roadways. It is estimated that three to four additional employees would be added to the facility to conduct the processing operations. Fluid milk shipments from the dairy would involve daily truck trips to Līhuʻe for shipment to offsite milk processing, located either on Kauaʻi and elsewhere in the state. Vehicle noise and air emissions would increase due to the added vehicle and trip trips on local roadways.

The pasture-based dairy facilities will require substantial electricity use, which would be partially offset by the operation of additional on-site solar energy generation. Solar energy collection with photovoltaic panels would be installed across the roof of the milking parlor facility, and tied into the overall on-site energy generating system. The dairy facility is anticipated to require the extension of additional 12 kV power supply, or offsite electrical system upgrades to the KIUC system serving the Kīpū area.

There would be an addition of 8 to 10 permanent jobs with the operation of the dairy facilities. State tax revenues would be increased through employment and sales taxes on dairy products. County real property tax revenues would be increased through higher property value assessment with the dairy operations.

(Note: Since this alternative location was evaluated in 2015, the land has been contracted for sale to another landowner who is not planning to develop a pasture-based dairy.)

6.6 MILK PRODUCTS PROCESSING BY HDF

As described in Chapter 3, the HDF Proposed Action is the sale of raw milk, wholesale, to a processor/packager. An alternative is for HDF to pasteurize raw milk on the island of Kauaʻi. The pasteurized milk could then be sold to a processor/bottler. Currently Meadow Gold is the only processor/packager with operational facilities on both Oʻahu and Hawaiʻi island. The island's last dairy was owned by Meadow Gold and closed in the year 2000; the facility on Kauaʻi ceased processing at that time, and became a distribution center until it was eventually closed.

Any pasteurization or processing facility would be sited in an appropriately zoned industrial area with access to adequate electricity, municipal potable water and wastewater services, and with existing roadway infrastructure suitable for required truck transport. On the island of Kauaʻi, an opportunity exists to retrofit and utilize the closed processing facility in Puhi, though this alternative requires cooperation of the facility owner, Meadow Gold. Capital expenditure for such a retrofit by HDF could be more than $1 million.

Anticipated Environmental Impacts – Milk Products Processing by HDF Alternative

The processing alternative by HDF would have no significant environmental impacts. The processing facility would be sited on lands with appropriate zoning for milk processing and accessory uses without a need for obtaining additional special permits.

Traffic associated with processing would add worker vehicle trips to the facility, Nawiliwili Harbor, and to and from Honolulu Harbor. Noise from worker vehicles and trucks would increase slightly.
due to the shipping. Vehicle emissions would also occur as a result of these shipments. The interisland transfers would occur as part of other freight components shipped on the existing regularly scheduled barge transits.

In-state milk production would increase agricultural revenues and jobs in Hawai‘i. With HDF processing, employment in the manufacturing industry would increase. Processing would generate substantial positive State and County revenues.

The milk processing operation would require potable water from the County system. The processing operation would also generate wastewater discharged to the County sewer system.

6.7 SUMMARY COMPARISON OF ALTERNATIVES

This chapter provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4):

Project Objectives (Section 2.3.3):

1. Provide more than 1,000,000 gallons annually of fresh, nutritious milk for Hawai‘i families at affordable prices and revitalize the dairy industry in Hawai‘i.
2. Apply proven, sustainable rotational-grazing pasture system and state-of-the-art technology to reduce reliance on costly imported fertilizer and feed.
3. Grow local, quality grass as a primary feedstock optimal for dairy cow nutrition and health, utilizing results of forage research conducted at five sites across four Hawaiian Islands.
4. Design facilities to provide animal comfort, including maximum time on pasture and minimal milking time.
5. Effectively integrate dairy operations within the island community setting.
6. Optimize dairy product shipping and marketing.
7. Provide local farming employment and build the agricultural economy.
8. Protect and enhance the area’s natural, cultural, social and economic environment through sound agricultural planning, preservation of open space and protection of sensitive resources, and development of economic benefit.

Evaluation Criteria (Section 2.3.4):

1. Secure sufficient contiguous land area under long-term lease with adequate water supply (including potable water to meet standards under milk rules), suitable soil properties, gentle slope conditions, and road accessibility.
2. Generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk products processing and dairy business management.
3. Create a model for dairy operations utilizing IAL, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure to advance food self-sufficiency.
4. Utilize 100 percent of manure on site as nutrients to grow forage for dairy cows. Grow sufficient forage to provide 70 – 85 percent of feedstock required for the herd.

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai’i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).

- None of the alternatives would secure a dairy location that meets the requirements for a rotational-grazing pasture dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua’i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.

- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai’i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai’i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai’i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

- The planned action will generate new long-term employment in the agricultural sector on Kaua’i, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

<table>
<thead>
<tr>
<th>HDF EVALUATION CRITERIA</th>
<th>Proposed Action: Committed</th>
<th>Proposed Action: Contemplated</th>
<th>No Action</th>
<th>Conventional Feedlot Dairy</th>
<th>Alternative Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Secure sufficient land area under long-term lease with adequate water supply (including potable water to meet standards under milk rules), suitable soil properties, gentle slope conditions, and road accessibility.</td>
<td>SUITABLE Suitable lease, water, soils, slopes and access</td>
<td>SUITABLE Suitable lease, water, soils, slopes and access</td>
<td>UNSUITABLE Either no farming or short term grazing lease</td>
<td>PARTIAL Suitable lease, water. Not reliant upon soils, Little to no pasture</td>
<td>UNSUITABLE Long-term farm lease not available, less suitable soils, slope and access</td>
</tr>
<tr>
<td>2. Generate new long-term employment in the agricultural sector in a wide range of positions including pasture agronomy/soils science, livestock management, veterinary and animal husbandry, environmental resources management, milk/milk products processing and dairy business management.</td>
<td>SUITABLE Employment in agricultural sector, including pasture agronomy, soil science and milk processing</td>
<td>SUITABLE Employment in agricultural sector, including pasture agronomy, soil science and milk processing</td>
<td>UNSUITABLE Employment limited with no pasture agronomy, no milk or milk products created.</td>
<td>SUITABLE Employment in agricultural sector</td>
<td>SUITABLE Employment in agricultural sector, including pasture agronomy, soil science and milk processing</td>
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<td>3. Create a model for dairy operations utilizing IAL, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure to advance food self-sufficiency.</td>
<td>SUITABLE Utilizes IAL with capital investment for food sustainability</td>
<td>SUITABLE Utilizes IAL with capital investment for food sustainability</td>
<td>UNSUITABLE Under-utilization of IAL without capital investment</td>
<td>UNSUITABLE Follows existing model of confined feedlot dairy</td>
<td>UNSUITABLE Site not designated as IAL</td>
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<td>4. Utilize 100 percent of manure on site as nutrients to grow forage for dairy cows. Grow sufficient forage to provide 70 – 85 percent of feedstock required for the herd.</td>
<td>SUITABLE 100% manure nutrients used as fertilizer for forage</td>
<td>SUITABLE 100% manure nutrients used as fertilizer for forage</td>
<td>UNSUITABLE Manure not managed as fertilizer</td>
<td>UNSUITABLE Manure concentrated in storage lagoons, no pasture forage feed</td>
<td>UNSUITABLE &lt; 100% manure nutrients used as fertilizer for forage</td>
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<td>CLIMATE</td>
<td>The scale of HDF is not large enough to influence global climate cycles related to solar radiation or evapotranspiration. No significant impacts are anticipated, and no mitigation would be required.</td>
<td>No adverse effect, comparable to proposed action</td>
<td>No adverse effect, comparable to proposed action</td>
<td>No adverse effect, comparable to proposed action</td>
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<td>TOPOGRAPHY</td>
<td>The dairy facility and associated infrastructure will be constructed in a 10-acre area, less than 1 acre will be utilized for built facilities. Pasture swales previously installed for agriculture and low-lying areas may be smoothed or filled to improve surface drainage and uniformity for grazing. Existing farm road will be slightly elevated, with cow raceways constructed in parallel above grade; swales will be created to direct run-off where needed. Minor effects to topography.</td>
<td>No adverse effect</td>
<td>No significant changes to site topography. Comparatively greater foundation excavation for larger dairy facilities.</td>
<td>Steeper grades would require significant topography changes to establish pasture paddocks and farm roadways. Foundation excavation for facilities.</td>
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<td>SOILS</td>
<td>Short-term soil disturbance for construction of roadways and dairy facilities will be minimized through the adherence to the Conservation Plan, best management practices, and controls per NPDES Construction Stormwater General Permit. Soil loss is expected to be within permitted thresholds and to not be significant. Long-term soil impacts are anticipated to result in improvements to the physical, chemical, and biological condition of the soil. Long term increase in soil organic matter and nutrient properties, expected to improve physical, chemical and biological conditions of the soil.</td>
<td>No adverse effect on soils.</td>
<td>Comparatively less short term soil disturbance for construction of roadways and dairy facilities.</td>
<td>Comparatively greater short term soil disturbance for construction of roadways and dairy facilities. Long term improvement of soil organic matter and nutrient properties.</td>
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<td>LAND USE &amp; AGRICULTURAL SETTING</td>
<td>Hawai‘i Dairy Farms will be in full compliance with its agricultural State Land Use District designation and embodies the IAL designation per the Hawai‘i State Constitution by using the protected lands in the project area for their intended purpose of diversified agriculture and agricultural self-sufficiency. Dairy use will not preclude the future potential for the coastal park at Mā‘alaea.</td>
<td>Cattle/sheep grazing use would retain the agricultural setting. Fallow overgrown lands would be comparably worse by not maintaining active agricultural land use.</td>
<td>Comparable to the proposed action, the feed lot dairy would be a consistent use of Important Agricultural Lands, and would retain the existing agricultural setting.</td>
<td>A pasture-based dairy is a consistent use of County Agricultural Lands, and will retain the existing agricultural setting. There would be potential impacts to downstream wildlife preserve areas.</td>
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<td>VISUAL &amp; AESTHETIC RESOURCES</td>
<td>No public scenic views or lookouts will be affected by dairy development or operations. There will be no adverse effect to public views of the Pu‘u Huluhulu crater, views from the Ala Kinoiki Road corridor, or impediment to views of the Hā‘upu Mountains from the HDF site.</td>
<td>Grazing activity would preserve views, while fallow overgrown lands would be comparably worse for views &amp; aesthetics.</td>
<td>The feed lot dairy would have several large barn structures with comparatively greater visibility than the proposed action, adverse effects to views &amp; aesthetics.</td>
<td>Dairy facilities and pasture paddocks will retain scenic vistas, with no adverse effects to views &amp; aesthetics.</td>
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<td>NATURAL HAZARDS</td>
<td>The dairy facilities will follow Building Code requirements for wind loading. Location is outside tsunami risk area and flood zone. Effluent pond capacity will exceed rain from 25-year/24-hour event. A natural disaster plan has been prepared by the Hawai‘i Dairy Farms’ manager to address hurricane, fire, and potential flooding hazard scenarios. HDF is not in a flood zone or tsunami inundation area.</td>
<td>No structures would be built, posing less risk due to natural hazards.</td>
<td>The feed lot dairy would have more barn structures posing greater comparative risk. Location outside tsunami risk area &amp; flood zone.</td>
<td>The dairy facilities will follow Building Code requirements for wind loading. Location outside tsunami risk area and flood zone. Potential drainage concerns related to surface watercourses in and adjoining the dairy site.</td>
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<td>ARCHAEOLOGICAL &amp; HISTORIC RESOURCES</td>
<td>No archaeological sites were found on the dairy site. Archaeological sites located beyond the mauka dairy boundary will be preserved. Fourteen post-European contact era sites associated with Plantation-era sugarcane cultivation were identified. No further work regarding these sites is recommended. Historic sites will be managed per SHPD for data recovery or adaptive reuse.</td>
<td>There would be no protection or management of archaeological sites and historic sites.</td>
<td>Comparable to the proposed action, per SHPD requirements, sites located beyond the dairy boundary will be preserved, and historic agricultural sites within the dairy site will be managed.</td>
<td>Archaeological sites are not known to exist at the alternative site. Newly identified archaeological sites and historic agricultural sites would be managed per SHPD requirements.</td>
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<td>CULTURAL RESOURCES</td>
<td>The perception of most community members interviewed was that the dairy may have indirect and direct negative impacts on the environment in the area. The findings of research related to preparation of the Cultural Impact Assessment for the dairy site, including interviews of community members, states that it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.</td>
<td>No change from existing.</td>
<td>Comparable to the proposed action.</td>
<td>Cultural impact assessment would need to be conducted to determine potential impacts at an alternative location.</td>
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<td>FLORA &amp; FAUNA</td>
<td>No threatened or endangered plants occur on the project property, and no intact native plant habitat exists within or surrounding the site. No critical habitat for endangered flora or fauna species is defined in or immediately surrounding the site; no impacts are anticipated from the dairy. Native plants with potential to stabilize banks will be encouraged and supplemented if needed to enhance the planned buffer strips along drainages. Potential use of paddocks by native, endangered waterbirds may occur. Outside lighting at night will be shielded to prevent attraction to overflying seabirds. No effect to bats is expected from that the dairy farm. HDF will develop an Avian Species Protection Plan and train employees to detect endangered waterbirds and nēnē, to prevent harmful impacts from operations.</td>
<td>Status quo.</td>
<td>The larger facility footprint will reduce open space in the valley. Fields would be unoccupied by cows and irrigation equipment. Large lagoons may provide an attractive nuisance to endangered waterbirds.</td>
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<td>INVERTEBRATE SPECIES &amp; PEST INSECTS</td>
<td>Strict dairy operation housekeeping, managed effluent ponds and pasture biological controls (e.g. dung beetle) will avoid fly populations at and beyond the dairy. Integrated pest management will be used disrupt the fly lifecycle and minimize populations of manure-related flies. Use of mechanical insect controls, including traps (outdoors) in paddocks where cows are excluded, and sticky tapes (indoors) will be used as needed for both monitoring and removal of flies.</td>
<td>Status quo.</td>
<td>Concentrations of manure waste would occur at several large feedlot areas, with no dispersion of manure, no soil cycle, and no fly population control measures for larger barns and waste ponds.</td>
<td>Active dairy housekeeping and pasture biological controls (e.g. dung beetle) would avoid fly populations at and beyond the dairy.</td>
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<td>NOISE</td>
<td>Construction work at the project site will involve activities that may generate an increase in noise levels. Noise related to construction will be a short-term condition, occurring during daylight hours. Milking equipment will be contained in the milking parlor structure, and field equipment such as tractors will typically be used during daylight hours. Dairy operations will generate noise in keeping with agricultural zoning of the parcel. Noise from the dairy will not exceed the DOH threshold, and will not contribute to excessive noise in the region.</td>
<td>Very limited noise would be generated by grazing and worker vehicle visits. No off-hour noises are anticipated, unless the site remains vacant and is unmanaged.</td>
<td>The dairy would generate low noise levels typical of agricultural activities associated with worker vehicles and transport trucks. No off-hour noises are anticipated.</td>
<td>The dairy would generate low noise levels typical of agricultural activities associated with worker vehicles and transport trucks. No off-hour noises are anticipated.</td>
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<td>HAZARDOUS SUBSTANCES</td>
<td>Illegal dumping at the dairy site will be curtailed by the active control and management of the land. Pesticides, herbicides, fuels and lubricants will be stored according to regulations and utilize secondary containment per best practices and requirements. No significant long-term impacts will occur from hazardous substances related to dairy operations, due to minimization of risk, secondary containment, and compliance with best management practices.</td>
<td>No hazardous materials would be used or stored on-site in the alternative. There would be potential for illegal dumping of hazardous materials if the site is not consistently controlled and managed.</td>
<td>The dairy operation would use a limited number of fuels, lubricants and solvents which will be managed according to State and Federal rules.</td>
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<td>PUBLIC SERVICES</td>
<td>Dairy facilities and dairy operations are not anticipat-ed to place a significant demand on fire protection, police, or medical services. The dairy will help to support these services through contributions to County real property tax. New residents to Kaua‘i associated with the dairy will place limited demands on public services, such as schools. A private service will collect solid waste.</td>
<td>Police, fire, and emergency medical service would not be required. Limited County real property tax revenues would be provided to support public services.</td>
<td>Police, fire, and emergency medical service would be required infrequently. The dairy would help support these services through County real property tax expenditures. New residents to Kaua‘i associated with the dairy would place limited demands on public services, such as schools. A private service would collect solid waste.</td>
<td>Police, fire, and emergency medical service would be required infrequently. The dairy would help support these services through County real property tax expenditures. New residents to Kaua‘i associated with the dairy would place limited demands on public services, such as schools. A private service would collect solid waste.</td>
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<td>DEMOGRAPHIC &amp; ECONOMICS</td>
<td>Direct plus indirect employment associated with Dairy development would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i. With ongoing operations at the committed herd size, 11 direct and indirect full-time equivalent jobs would be created on Kaua‘i, including 5 farm jobs and about 6 indirect jobs. An additional 3 indirect jobs would be created on O‘ahu. Employment for the contemplated herd size would be double. The dairy will generate substantial positive State and County revenues. In-state milk production will expand agricultural revenues and jobs in Hawaii. New residents to Kaua‘i associated with the dairy will place limited demands on public services, with offsetting revenues.</td>
<td>No construction jobs or full time jobs would be created, and no revenues to other agricultural operations on Kaua‘i. Limited County real property tax revenues and State tax revenues would be generated.</td>
<td>The dairy would create construction jobs and over 20 full time jobs, and provide long-term revenues to agricultural partners on Kaua‘i. The dairy would generate substantial positive State and County revenues. In-state milk production would expand agricultural revenues and jobs in Hawaii. New residents to Kaua‘i associated with the dairy would place limited demands on public services, with offsetting revenues.</td>
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### Groundwater Resources

- **Proposed Action (699 Cows):**
  - There are over 100 wastewater treatment injection wells serving resort development in Poʻipu. The potential inputs to shallow groundwater from the pasture-based dairy will represent less than 5% of the total nutrients disposed each day from the existing wastewater injection wells in Poʻipu. Construction of HDF facilities is not anticipated to deplete the groundwater source or interfere with recharge.
  - Short-term water supply demand during the construction period is anticipated to be nominal. The major water demand during construction will be for fugitive dust control. Water will come from a non-municipal source: either the on-site deep wells; or from the HDF allocation from Waita Reservoir. The dairy will utilize 30,000 gpd of groundwater from on-site wells for potable uses: livestock water; and sanitation in the milking parlor. The demand of approximately 30,000 gpd (0.03 MGD) for potable water is well within the capacity of the existing Māhāʻulepū 14 well which produced 3 MGD during the sugarcane plantation era. Potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle.
  - The groundwater and surface water assessment determined there is no hydrologic connection between the aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Thus nutrients added by the dairy operation will have no impacts to the County drinking water well and potable water within the deep volcanics, the source of potable water. Further, the assessment concluded that the modest potable water use rate for dairy operations, and the 4,500-foot distance between the onsite potable water well and the nearest County potable water well (Kōloa Well F), mean that no adverse impacts to ongoing use of groundwater in the unweathered volcanics will occur from this use.

- **No-Action Alternative:**
  - The no-action alternative would have limited to no effect on groundwater resources. A small portion of nutrients resulting from cattle/sheep manure breakdown in pasture areas will enter shallow groundwater.

- **Conventional Feed Lot Dairy:**
  - The feedlot dairy will utilize 30,000 gpd of groundwater from on-site wells for potable use at the dairy office and wash down at the milking parlor and barn area. Additional water would be required for the very extensive washdown requirements associated with the conventional dairy. Groundwater source supply and quality at the Kōloa Well F would not be adversely affected by the dairy operations.

- **Alternative Location:**
  - The dairy would utilize approximately 30,000 gpd of groundwater from on-site wells for potable use at the dairy office and wash down at the milking parlor and barn area.
  - The pasture-based dairy would irrigate pastures utilizing non-groundwater from the closest available agricultural reservoir system, blended with water in the effluent storage ponds. Groundwater source supply and quality at the nearest aquifer source would not be adversely affected by the requirements for the dairy operations.
  - Shallow groundwater underlying the pasture paddocks could receive minor contributions of dissolved nutrients in applied effluent irrigation, applied fertilizer and natural manure breakdown.
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<td>SURFACE WATER RESOURCES</td>
<td>Controls and best management practices to avoid, control, and trap potential erosion associated with construction activities will be implemented. Any stormwater discharge associated with construction in the short-term will be in compliance with relevant regulations. Over the long-term, adherence to the Conservation Plan and best management practices establishes setbacks to minimize impacts to waterways. The setback for effluent application is 50 feet from each side of surface waters. Perimeter fencing to exclude cows from surface waters provides a 35-foot buffer on either side of the drainage ways. Vegetative buffers will be maintained within the 35-foot setback from the drainageways. Episodic, seasonal rainfall events (~10 days/yr) cause groundwater in the alluvium to rise and intersect with the agricultural ditches and groundwater containing nutrients. HDF will release an estimated 10,000 pounds of nitrogen and 900 pounds of phosphorus annually. Contributions of nutrients from episodic rainfall (10 days/yr) will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs in several meters from shore. Over 120 wastewater treatment injection wells serving resort development in Po'ipu. Nitrogen input to the marine environment in the Po'ipu region is calculated to be 38,510 pounds annually, or 3.5 times more than the potential HDF nutrient throughput. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. State DOH surveys and environmental sampling/testing programs have identified high levels of enterococci bacteria in the agricultural ditches, particularly near the terminus of the ditch near the ocean. State standards apply to recreational waters, and the ditch is not utilized recreationally by bathers. Over the long-term, the surface water quality in the agricultural ditches and Waipoilii Ditch will be improved by active management of the dairy site. The dairy site represents roughly 20 percent of the 2,700-acre Māhā'ulepū Valley sub-watershed, and soil erosion from the HDF site will be reduced by establishment of thick grass ground cover and maintenance of vegetative buffers totaling 70 feet in width – 35 feet on either side of the agricultural drainageways.</td>
<td>The no-action alternative would generate limited surface water quality impacts associated with manure from grazing animals, and soil erosion during peak storm runoff events. If the land is not used for grazing, there would continue to be some level of ongoing soil erosion. Compared to the storm runoff constituents from a pasture-based dairy there would be lower nutrient contributions and greater soil erosion contributions to the ditches and stream. The feedlot dairy operation is expected to generate comparably greater amounts of dissolved nutrients in surface water runoff during large storm events. Natural vegetation buffers would be established along agricultural drainage ditches bordering the effluent disposal fields. Buffers would aid capture suspended sediment and plants/thatch will uptake dissolved nutrients. On average four to five times each year, large rainfall events will generate peak storm water flows from pastures which will enter the agricultural ditches, which merges into Waipoilii Stream. Under peak storm flow conditions, the dairy contributions of suspended sediment and nutrients will represent a minor amount of contaminants of stormwater draining into the agricultural ditches and stream, and eventually reaching the ocean. The nearshore ocean water off Māhāʻelepū is a highly mixed environment which actively disperses natural inputs. Minor contributions of nutrients associated with dairy storm runoff during peak rainfall events will not adversely affect ocean water quality and the marine environment. The feedlot dairy operation is expected to generate minor amounts of dissolved nutrients in surface water runoff during large storm events. Dissolved nutrients in surface runoff will result from applied effluent irrigation, applied fertilizer, and manure breakdown. Natural vegetation buffers established along agricultural drainage ditches bordering the pasture paddocks will effectively capture suspended sediment and uptake dissolved nutrients. On average four to five times each year, large rainfall events will generate peak storm water flows from pastures which will flow into agricultural ditches. Under these conditions, the dairy contributions of suspended sediment and nutrients will represent a minor amount of contaminants entering surface water, and ultimately these drainages discharge into the receiving waters of Hulēʻia Stream. The minor contributions of nutrients from the pasture-based dairy associated with storm water runoff to agricultural ditches during peak rainfall events would not be anticipated to adversely affect stream water quality and the aquatic environment. The alternative site drains into Hulēʻia Stream which leads downstream to Hulēʻia National Wildlife Refuge, and eventually reaching Nawiliwili Bay. The nearshore ocean water off Nawiliwili Bay is a highly mixed environment which actively disperses natural and man-made inputs.</td>
<td>The alternative location for the pasture-based dairy operation is expected to generate minor amounts of dissolved nutrients in surface water runoff during large storm events. Dissolved nutrients in surface runoff will result from applied effluent irrigation, applied fertilizer, and manure breakdown. Natural vegetation buffers established along agricultural drainage ditches bordering the pasture paddocks will effectively capture suspended sediment and uptake dissolved nutrients.</td>
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HAWAI’I DAIRY FARMS
Draft Environmental Impact Statement

ENVIRONMENTAL RESOURCE | PROPOSED ACTION (699 COWS) | NO-ACTION ALTERNATIVE | CONVENTIONAL FEED LOT DAIRY | ALTERNATIVE LOCATION
---|---|---|---|---
ROADWAYS & TRAFFIC | Short-term construction traffic will occur during the development of the dairy facilities. For the long-term, worker vehicles and delivery and supply trucks will access the dairy on a weekly basis. The number of vehicles associated with the dairy at the committed herd size will increase by approximately 12 vehicles per day, and will not represent a significant amount of the total traffic on local roadways. Traffic conditions on roadways in Poipū and Kōloa will not deteriorate as a result of the dairy operations. | The no-action alternative would have little traffic, with minimal daily worker vehicle trips associated with a grazing operation. If left fallow, there would be no traffic with this alternative. | Short-term construction traffic would occur during the development of the feedlot dairy facilities. Over the long-term, dairy worker vehicles and trucks would access the site on a daily basis. Without use of the pasture paddocks for grazing, cows would depend 100% upon feed. With a herd of 699 cows, imported feed supply would be a major requirement for this dairy, requiring daily truck deliveries of grain feed for the cows. The number of vehicles associated with the dairy will not represent a significant amount of the total traffic on local roadways. Traffic conditions on roadways in Poipū and Kōloa would not deteriorate as a result of the feedlot dairy operations. | Short-term construction traffic would occur during the development of the dairy facilities. For the long-term, worker vehicles and trucks will access the pasture-based dairy on a daily basis. The number of vehicles associated with the dairy will not represent a significant amount of the total traffic on local roadways. Traffic conditions on roadways in Pāhū will not deteriorate as a result of the dairy operations. |

AIR QUALITY, ODOR & GREEN-HOUSE GASES | Construction effects on air quality including dust and construction vehicle emissions will be temporary and reduced by best management practices and short-term mitigation measures. Odor conditions at the pasture-based dairy will be limited within the dairy project area and immediate vicinity. In the worst-case meteorological conditions, odor may reach approximately 1,670 feet south of the HDF southern boundary. There are no homes or resort facilities in this area. The odors will not reach resort or residential communities. For the area within the modeled odor isopleth, odor may be detectable by 50 percent of the population at a frequency of once every 200 hours, or roughly 44 hours per year. | The no-action alternative would generate no emissions or add to greenhouse gas production. Depending upon the number of grazing cattle or sheep, odors could result from manure waste in the grazing pasture. | For the feedlot dairy option, short-term construction would affect air quality including dust and construction vehicle emissions, reduced by mitigation actions. Odor conditions at the pasture-based dairy will be limited within the dairy project area and immediate vicinity. No adverse odor conditions will result in the 2+ mile distant resort and residential community. The production of greenhouse gases will be reduced by producing milk locally for Hawaii consumers, versus greenhouse gas emissions due to ocean shipping milk from the US mainland. | At the alternative site, there would be short-term construction effects on air quality including dust and construction vehicle emissions, reduced by mitigation actions. Odor conditions at the alternative site for the pasture-based dairy will be limited within the dairy project area and immediate vicinity. No adverse odor conditions will result in the 2+ mile distant resort and residential community. The production of greenhouse gases would be reduced by producing milk locally for Hawaii consumers, versus greenhouse gas emissions due to ocean shipping milk from the U.S. mainland. |

CUMULATIVE IMPACTS | The development and operation of the pasture based dairy will be combined with impacts associated with anticipated future developments in the Poipū and Kōloa region. With mitigation, there will be limited short term impacts such as soil erosion, dust, worker traffic and vehicle emissions. Long-term cumulative effects will include limited soil erosion, storm water runoff, groundwater use, nutrient contributions to agricultural ditches, worker vehicle traffic, and air emissions. Odors will be contained within the dairy and limited adjacent farms. In addition to injected wastewater nutrients entering the nearshore ocean waters generated by the Poipū resort and residential areas, there will be minor amounts of nutrients contributed from the pasture-based dairy. The dairy will provide net economic benefits, adding to the agricultural economy of Kaua’i. | The no-action alternative generally would not contribute to cumulative impacts. Grazing operations without mitigation controls would add to soils erosion, nutrients in storm runoff. Depending upon the herd size, the grazing operation could generate potential odors. | The effects associated with the development and operation of a feedlot confined dairy would combine with impacts associated with anticipated future developments in the Poipū and Kōloa region. With mitigation, there would be limited short term impacts such as soil erosion, dust, worker traffic and vehicle emissions. Less land would be committed with minimal pasture area. Long-term cumulative effects would include limited soil erosion, storm water runoff, groundwater use, nutrient contributions to agricultural ditches, worker vehicle traffic, and air emissions. Odors would likely extend into the resort community. In addition to injected wastewater nutrients entering the nearshore ocean waters generated by the Poipū resorts and residential areas, there will be comparatively greater amounts of nutrients contributed from the pasture-based dairy. The feedlot dairy will provide net economic benefits, adding to the agricultural economy of Kaua’i. | The development and operation of the alternative site for the pasture based dairy would be combined with impacts associated with anticipated future developments in the Poipū and Kōloa region. With mitigation, there will be limited short term impacts such as soil erosion, dust, worker traffic and vehicle emissions. Long-term cumulative effects will include limited soil erosion, storm water runoff, groundwater use, nutrient contributions to agricultural ditches, worker vehicle traffic, and air emissions. Odors will be contained within the dairy and limited adjacent farms. There would be minor nutrients contributions from the pasture-based dairy to Hulii’a Stream. The dairy will provide net economic benefits, adding to the agricultural economy of Kaua’i. |

GREATER COMPARATIVE IMPACTS

The development and operation of the pasture based dairy will be combined with impacts associated with anticipated future developments in the Poipū and Kōloa region. With mitigation, there will be limited short term impacts such as soil erosion, dust, worker traffic and vehicle emissions. Long-term cumulative effects will include limited soil erosion, storm water runoff, groundwater use, nutrient contributions to agricultural ditches, worker vehicle traffic, and air emissions. Odors will be contained within the dairy and limited adjacent farms. In addition to injected wastewater nutrients entering the nearshore ocean waters generated by the Poipū resorts and residential areas, there will be minor amounts of nutrients contributed from the pasture-based dairy. The dairy will provide net economic benefits, adding to the agricultural economy of Kaua’i.

The development and operation of the alternative site for the pasture based dairy would be combined with impacts associated with anticipated future developments in the Poipū and Kōloa region. With mitigation, there will be limited short term impacts such as soil erosion, dust, worker traffic and vehicle emissions. Long-term cumulative effects will include limited soil erosion, storm water runoff, groundwater use, nutrient contributions to agricultural ditches, worker vehicle traffic, and air emissions. Odors will be contained within the dairy and limited adjacent farms. There would be minor nutrients contributions from the pasture-based dairy to Hulii’a Stream. The dairy will provide net economic benefits, adding to the agricultural economy of Kaua’i.
7.0

AGENCIES AND PARTIES CONSULTED
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7.1 AGENCIES AND PARTIES CONSULTED

This section presents a listing of agencies and parties consulted in the preparation of this EIS.

Table 7-1 lists the agencies, organizations, and individuals who were either: 1) formally consulted, provided a presentation, or notified early in the planning process or are a part of an ongoing consultation effort throughout the environmental review process; 2) officially received a copy of the Environmental Impact Statement Preparation Notice (“EISPN”); or 3) responded to the EISPN with a comment letter. Entities to be sent will have received a copy of the Draft Environmental Impact Statement (“DEIS”) upon publication are also indicated.

Copies of formal comment letters received during the EISPN comment and the applicant’s responses are included in this section. The list of consulted parties will be updated to indicate future comments to be received during the 45-day DEIS review period that commences upon formal notice issued in the Office of Environmental Quality Control’s The Environmental Notice.

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**E. Elected Officials**

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- Councilmember, Arryl Kaneshiro     | X |
- Councilmember, Gary L Hooser | X |
- Councilmember, JoAnn A. Yukimura | X |
- Councilmember, KipuKai Kualiʻi | X |
- Councilmember, Mason K. Chock | X |
- Honorable Mayor Bernard P. Carvalho, Jr. | X |
- Representative Dee Morikawa, House District 16 | X |
- Representative Derek S.K. Kawakami, House District 14 | X |
- Representative James K. Tokioka, House District 15 | X |
- Senator Ronald D. Kouchi, Senate District 8 | X |

**F. Media**

- The Garden Island | X |

**H. Libraries**

- Department of Education
  - Hawaiʻi State Library
  - Hawaiʻi Documents Center
- Hawaiʻi Kai Regional Library
- Hilo Regional Library
- Kahului Regional Library
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Table 7-1  Consulted Parties

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7.2 COMMENTS AND RESPONSES TO THE EISPN

Hawai’i Dairy Farms Draft EIS Volume 3 and Volume 4 contains the EISPN comment letters and responses.
8.0

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8.0 LIST OF REFERENCES AND PREPARERS OF THE EIS

8.1 References


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8.2 PREPARERS OF THE EIS

Below is a list of individuals that contributed to the preparation and completion of this Environmental Impact Statement (EIS). The list includes the name of the individual and their role, or the name of the company and the subfield of professional expertise utilized to conduct and complete the EIS.

**Hawai‘i Dairy Farms, LCC**

Kyle Datta  
Greg Gaug  
Amy Hennessey  Director of Communications  
Jim Garmatz

**Group 70 International, Inc.**

Jeffrey H. Overton, AICP  Principal Planner  
Paul T. Matsuda, P.E., LEED AP  Principal, Director of Civil Engineering  
Barrie Fox Morgan, AICP  Environmental Planner  
Ryan M. K. Char, P.E., LEED AP  Associate, Project Manager  
Jeffrey Seastrom, AICP  Environmental Planner  
Silas Haglund  Graphics and Document Specialist  
Stephanie Saephan, GISP  GIS Specialist  
Reyna DePonte  Administrative Support

**Technical Consultants**

AECOS Consultants  Flora Survey  
Arcadis  Air Quality/Odor Assessment/Greenhouse Gas  
Group 70 International  Nutrient Balance Analysis  
Marine Research Consultants, Inc.  Surface Water Quality & Marine Assessment  
Plash Econ Pacific Inc.  Demographic and Economic Analysis  
Rana Biological  Faunal Survey  
Red Barn Consulting  Hydrological Assessment  
Russell Yost, Ph. D.  Soils and Agronomy Analysis  
Scientific Consultant Services, Inc.  Archaeological Inventory Survey  
Cultural Impact Assessment  
Steven Lee Montgomery, Ph. D  Entomology (Manure Related Insects)  
Tom Nance Water Resource Engineering  Groundwater and Surface Water Analysis
HAWAI‘I DAIRY FARMS

DRAFT ENVIRONMENTAL IMPACT STATEMENT

VOLUME 2
TECHNICAL APPENDICES

This environmental document is prepared pursuant to Hawai‘i Revised Statutes, Chapter 343, Environmental Impact Statement Law and Chapter 200 of Title 11, Administrative Rules, Department of Health, Environmental Impact Statement Rules.

SUBMITTED BY:

Hawai‘i Dairy Farms

MAY 2016
HAWAI‘I DAIRY FARMS

DRAFT ENVIRONMENTAL IMPACT STATEMENT

VOLUME 2
TECHNICAL APPENDICES

SUBMITTED BY:
Hawai‘i Dairy Farms
MAHA‘ULEPU, KAUA‘I

PREPARED BY:
GROUP 70 INTERNATIONAL
Architecture • Planning & Environmental Services • Interior Design • Civil Engineering
925 Bethel Street, 5th Floor, Honolulu, HI 96813 (808) 523-5866

This environmental document is prepared pursuant to Hawai‘i Revised Statutes, Chapter 343, Environmental Impact Statement Law and Chapter 200 of Title 11, Administrative Rules, Department of Health, Environmental Impact Statement Rules.

Jeffrey H. Overton, AICP, LEED AP
5/26/16
Date

MAY 2016
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<td><strong>FLORA AND FAUNA SURVEYS</strong></td>
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<td><strong>SURFACE WATER QUALITY &amp; MARINE ASSESSMENT</strong></td>
<td>Baseline Conditions and an Assessment of the Effect of the Proposed Hawaii Dairy Farm on Surface Water and Marine Water Chemistry Mahaulepu, Kauai, Hawaii</td>
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I  AIR QUALITY/ODOR ASSESSMENT/GREENHOUSE GAS
Hawaii Dairy Farms Air Emissions and Odor Evaluation Technical Report
Arcadis. April, 2016.

J  DEMOGRAPHIC AND ECONOMIC ANALYSIS
Hawaiʻi Dairy Farms: Demographic and Economic Assessment

K  HYDROLOGICAL ASSESSMENT
Hydrologic Assessment for the Pasture Areas for Hawaiʻi Dairy Farms, Māhāʻulepū, Kauaʻi, Hawaiʻi
APPENDIX A

FLORA AND FAUNA SURVEYS CONDUCTED
FOR THE KAUA'I DAIRY FARMS PROJECT
MĀHĀʻULEPŪ, ISLAND OF KAUAʻI, HAWAIʻI.

RANA BIOLOGICAL CONSULTING
AECOS CONSULTANTS
Flora and Fauna Surveys Conducted for the Kauai Dairy Farms Project, Māhā‘ulepū, Island of Kaua‘i, Hawai‘i

Prepared by:

Reginald E. David
Rana Biological Consulting
P.O. Box 1371
Kailua-Kona, Hawai‘i 96745

&

Eric Guinther
AECOS Consultants
45-309 Akimala Pl.
Kāne‘ohe, Hawai‘i 96744

Prepared for:

Group 70 International
925 Bethel Street, Fifth Floor
Honolulu, Hawaii 96813-4307

April 2016
# Table of Contents

Introduction and Background ........................................................................................................ 3
General Site Description ...................................................................................................................... 4

Methods ........................................................................................................................................... 8
- Botanical Survey .......................................................................................................................... 8
- Avian Survey Methods .................................................................................................................. 8
- Mammalian Survey Methods ........................................................................................................ 9

Results ............................................................................................................................................. 9
- Botanical Survey .......................................................................................................................... 9
- Vegetation ..................................................................................................................................... 9
- Flora .......................................................................................................................................... 9
- Avian Survey Results .................................................................................................................... 15
- Mammalian Survey Results .......................................................................................................... 17
- Aquatic Features ............................................................................................................................. 18

Discussion ..................................................................................................................................... 22
- Botanical Resources ...................................................................................................................... 22
- Avian Resources ............................................................................................................................. 22
- Mammalian Resources .................................................................................................................... 23

Potential Impacts to Protected Species ......................................................................................... 25
- Botanical ..................................................................................................................................... 25
- Waterbirds .................................................................................................................................. 25
- Nēnē ............................................................................................................................................ 25
- Seabirds ....................................................................................................................................... 26
- Hawaiian hoary bats ..................................................................................................................... 26

Recommendations ............................................................................................................................. 26
- Construction ................................................................................................................................ 26
- Dairy Operations ............................................................................................................................ 27

Critical Habitat ................................................................................................................................. 28

Glossary ............................................................................................................................................ 29

Literature Cited ................................................................................................................................. 30
Introduction and Background

In late 2013, Ulupono Initiative made the investment to fund Hawaii Dairy Farms, the first pasture-based rotational-grazing dairy in the state. Hawaii Dairy Farms LLC (HDF) was formed as a positive step towards the island state's food security, economic diversity and sustainability. Experimental trials were conducted to determine lands capable of growing nutritious forage for dairy cows, and lands meeting the operational requirements for a dairy operation were identified. Kaua‘i was determined to best meet the operational requirements, and Māhā‘ulepū Valley was found to provide ideal grass growing conditions.

At steady-state production with 699 milking cows, the farm will produce roughly 1.2 million gallons annually at market price. HDF will reduce Hawaii’s reliance on imported milk from the mainland United States by increasing current fresh local milk production by approximately 33 percent. The farm will be based on the most successful island dairy models in the world, and will utilize a sustainable, pasture-based rotational-grazing system and 21st century technology. The farm will be very different from conventional feedlot dairy operations.

HDF is committed to establishing a herd of up to 699 mature dairy cows, and demonstrating the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. The application process for a National Pollutant Discharge Elimination System (NPDES), Concentrated Animal Feeding Operation (CAFO) permit includes public notification and input. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is currently estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time that HDF may decide to pursue an expanded operation.

The project site is located on approximately 557 acres identified as TMK: (4) 2-9-003: 001 por. and 006 por. and (4) 2-9-001: 001 por. Located in Māhā‘ulepū Valley (Figure 1).

This report describes the methods used and the results of the botanical, avian and terrestrial mammalian surveys conducted on the project site as part of the environmental disclosure process associated with the proposed project.

The primary purpose of the surveys was to determine if there are any botanical, avian and terrestrial mammalian species currently listed, or proposed for listing under either federal or State of Hawai‘i endangered species statutes within or adjacent to the study area. We
were also asked to evaluate the potential impacts that the development of the project might pose to any sensitive or protected native botanical, avian or mammalian species, and to propose appropriate minimization measures that could be implemented to reduce or eliminate any such impacts. The federal and State of Hawai‘i listed species status follows species identified in the following referenced documents, (Hawaii Department of Land and Natural Resources (HDLNR) 1998, U. S. Fish & Wildlife Service (USFWS) 2005a, 2005b, 2014a). Fieldwork was conducted on August 20 and 21, 2014.

Hawaiian and scientific names are italicized in the text. A glossary of technical terms and acronyms used in the document, which may be unfamiliar to the reader, are included at the end of the narrative text.

**General Site Description**

The project area was historically used for sugar cane production as part of the Kōloa Plantation until the late 1990s when the Kōloa Mill closed. Since the mill closure, the project area has been leased to various tenants for ranching and diversified agricultural operations. A small plot of land in the lower center of the valley is currently used for mixed agriculture, including taro lo‘i, and will continue to be leased and farmed separate from the dairy and related pastures.

The original sugar cane agricultural infrastructure is largely still in place and continues to be used for on-going agricultural activities. Much of this existing infrastructure will also be used for the dairy, but with significant upgrades and improvements. The existing infrastructure in the project area includes: gravel access roads, field roads, water wells, reservoirs, pipelines, pumps, irrigation ditches, drainage ways and culverts.
Figure 1 – Project Site, Showing TMK Boundaries and Project Boundaries
As previously mentioned the project site is situated in the Māhāʻulepū Valley on the island of Kaua‘i. The valley is on the leeward side of the Hāʻupu mountain ridge, which runs in the east-west direction, and the valley is flanked by ridgelines. Mt. Hāʻupu (Fig. 3) is the highest point on the ridgeline at the back of the valley reaching an elevation of 700 meters above mean sea level (AMSL). From this point, the ground drops away very quickly down to the bottom of the valley to an elevation of approximately 45 meters AMSL. The base of the valley itself gradually slopes from an elevation of approximately 45 meters AMSL down to an elevation of approximately 18 meters AMSL along Māhāʻulepū Road on the makai side of the project site near the taro farm.

Vegetation on the site is best categorized as pasture land (Figures 2 and 3).

Figure 2 - Māhāʻulepū Valley looking south from the northern crossroad showing typical pasture land.
Figure 3 - Māhāʻulepū Valley looking north to Hāʻupu peak from the central road showing typical pasture land and valley walls
**Methods**

*Botanical Survey*

Plant names mostly follow the *Manual of the Flowering Plants of Hawai‘i* (Wagner et al., 1990, 1999) for native and naturalized flowering plants, *A Tropical Garden Flora* (Staples and Herbst, 2005) for crop and ornamental plants, and *Hawai‘i’s Ferns and Fern Allies* for ferns (Palmer, 2003). Some plant species names have been updated following more recently published literature as summarized in Imada (2012).

The botanical survey involved a wandering pedestrian transect method that traversed all parts of the property within the designated survey area (Figure 1). A wandering survey is standard methodology for plant surveys of specific parcels of land as it is superior to fixed, linear transects at discovering rare plant species. A hand-held, global navigation satellite system (GNSS) unit (Trimble, 6000 Series GeoXH) was used to record the progress of the botanist and provide real-time feedback on coverage of the survey area. Plant species were identified as they were encountered and field notations used to develop a qualitative sense of abundance as the survey progressed. For a few species not immediately recognized in the field, photographs were taken and/or material collected for identification in the laboratory.

The survey period represents the dry season in Hawai‘i. Although Kaua‘i was at 87% of normal rainfall for the months of June-August 2014, these values may not reflect conditions along the south coast where the vegetation in the survey area appeared healthy and well-watered during the survey period (rainfall received appeared to be above normal for a dry season).

*Avian Survey Methods*


A total of 28 avian point count stations were sited approximately 300 meters apart along four linear transects running the length of the project site within Māhā‘ulepū Valley. The transects ran roughly in a north-to-south direction. Six-minute point counts were made at each of the count stations. Each station was counted once. Field observations were made with the aid of Leica 8 X 42 binoculurs and by listening for vocalizations. Point counts were concentrated during the early morning hours, the peak of daily bird activity. Time not spent at point count stations was used to search the remainder of the project site for species and habitats that were not detected during count sessions.
Mammalian Survey Methods

With the exception of the endangered Hawaiian hoary bat (Lasiurus cinereus semotus), or ʻōpeʻapeʻa as it is known locally, all terrestrial mammals currently found on the Island of Kauaʻi are alien species, and most are ubiquitous. The survey for terrestrial mammalian species was limited to visual and auditory detection, coupled with visual observation of scat, tracks, and other animal sign. A running tally was kept of all terrestrial vertebrate mammalian species detected within the project area during time spent within the project site.

Results

Botanical Survey

Vegetation

The proposed Kauai Dairy farms project site is presently nearly all pastureland. The pastures vary between recently tilled and various states of weedy regrowth. No active grazing was observed. Consequently, while many of the pastures are a mix of open ground and weedy growth, others are densely overgrown with grasses and other herbaceous plants. Trees are few and scattered, mostly along waterways on the property. Along the edges of the survey area, on the east, north, and west, the sloping land is forested. Since nearly all of this forest is out of the survey area, it was visited at numerous points along the margin but not entered for any significant distance (generally only as far as the old circum-valley ʻauwai). Thus, the vegetation within the project area is herbaceous and typical of regularly disturbed land (i.e., agricultural).

Flora

“Flora” refers to the species diversity of plants growing in the survey area. A plant checklist (Table 1) was compiled from field observations, with entries arranged alphabetically under plant family names (standard practice). Included in the list are scientific name, common name, and status (for example, whether native or non-native, naturalized or ornamental) for each species observed during the survey.

Qualitative estimates of plant abundance were recorded for each species. Abundance values are coded in the table as explained in the Legend to Table 1. For some species, a two-level system of abundance is used; with a letter-number code indicating a species having a somewhat clustered distribution. For example, a species infrequently encountered but numerous where found would have an abundance rating of “R” indicating a plant encountered only one to three times during the entire survey of the site, but an “R2” to indicate several to many individuals present where encountered. An “R3” would be a plant similarly seldom encountered (i.e., rare), but numerous in one or more of the locations where encountered. A species marked “03” would be one seen with some regularity, usually occurring in patches of numerous individuals (as opposed to “C” for a species seen with regularity throughout the survey area). For abundances C or A, attached numbers are
an indication of a patchy distribution: “C3” would be a species generally common (regularly encountered), but especially numerous in patches.

The note “<1>” indicates a species always observed around the margin of the survey area. For most of these species, the recorded occurrences are close to or actually outside the survey area boundary. Consequently, the abundance values are more indicative of the vegetation immediately off the property. For example, all of the ferns recorded are marked with “<1>”. None of these was seen within the survey area; all occurred along dry stream beds immediately off the property, so close to the boundary that the species is clearly representative of the lands surrounding the pasture lands. Eighteen species (15.6%) of the total species fall into this “category” of being mostly representative of the lands outside of the survey area. This percentage is fairly large and reflects the stark contrast between the forested slopes beyond the project area and the project area pastures.

Table 1 – Flora for Kaua‘i Dairy Farms, August 2014

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<td>Nat</td>
<td>R</td>
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<td><em>lauae</em></td>
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<td><em>Psilotum nudum</em> (L.) P. Beauv.</td>
<td><em>moa</em></td>
<td>Ind</td>
<td>R</td>
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<td><em>Christells dentata</em> (Forssk.) Brownsey &amp; Jermy</td>
<td>wood fern</td>
<td>Nat</td>
<td>R</td>
</tr>
<tr>
<td><strong>GYMNOSPERMS</strong></td>
<td></td>
<td></td>
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<tr>
<td>ARAUCARIACEAE</td>
<td><em>Araucaria columnaris</em> (G. Forst.) J. D. Hook.</td>
<td>Cook-pine</td>
<td>Nat</td>
<td>R</td>
</tr>
<tr>
<td><strong>FLOWERING PLANTS</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>DICOTYLEDONS</td>
<td></td>
<td></td>
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<tr>
<td>ACANTHACEAE</td>
<td><em>Thunbergia fragrans</em> Roxb.</td>
<td>sweet clockvine</td>
<td>Nat</td>
<td>U</td>
</tr>
<tr>
<td>AMARANTHACEAE</td>
<td><em>Achyranthes aspera</em> L.</td>
<td>---</td>
<td>Nat</td>
<td>R</td>
</tr>
<tr>
<td></td>
<td><em>Alternanthera pungens</em> Kunth</td>
<td>khaki weed</td>
<td>Nat</td>
<td>O2</td>
</tr>
<tr>
<td>Scientific Name</td>
<td>Common Name</td>
<td>NAT</td>
<td>US</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>------------------------------</td>
<td>------</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>Amaranthus viridis L.</td>
<td>slender amaranth</td>
<td>Nat</td>
<td>U</td>
<td></td>
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<tr>
<td>Amaranthus spinosus L.</td>
<td>spiny amaranth</td>
<td>Nat</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>Gomphrena celosioides Mart.</td>
<td>---</td>
<td>Nat</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>Schinus terebinthifolius Raddi</td>
<td>Christmas berry</td>
<td>Nat</td>
<td>C1</td>
<td>&lt;1&gt;</td>
</tr>
<tr>
<td>Ageratum conyzoides L.</td>
<td>maile hohono</td>
<td>Nat</td>
<td>R</td>
<td>&lt;2&gt;</td>
</tr>
<tr>
<td>Bidens pilosa L.</td>
<td>ki</td>
<td>Nat</td>
<td>R</td>
<td></td>
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<tr>
<td>Conyza bonariensis (L.) Cronq.</td>
<td>hairy horseweed</td>
<td>Nat</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>Elephantopus mollis Kunth</td>
<td>---</td>
<td>Nat</td>
<td>U1</td>
<td>&lt;1,2&gt;</td>
</tr>
<tr>
<td>Emilia fosbergii Nicolson</td>
<td>Flora’s paintbrush</td>
<td>Nat</td>
<td>U</td>
<td></td>
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<tr>
<td>Lactuca serriola L.</td>
<td>prickly lettuce</td>
<td>Nat</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>Parthenium hysterophorus L.</td>
<td>false ragweed</td>
<td>Nat</td>
<td>AA</td>
<td></td>
</tr>
<tr>
<td>Pluchea carolinensis (Jacq.) G. Don</td>
<td>sourbush</td>
<td>Nat</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>Sonchus oleraceus L.</td>
<td>sow thistle</td>
<td>Nat</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>Xanthium strumarium L.</td>
<td>kīkānia</td>
<td>Nat</td>
<td>AA</td>
<td></td>
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<tr>
<td>Lepidium virginicum L.</td>
<td>---</td>
<td>Nat</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Cereus uruguayanus Ritter ex R. Kliesling</td>
<td>hedge cactus</td>
<td>Nat</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>Ipomoea obscura (L.) Ker-Gawl.</td>
<td>---</td>
<td>Nat</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>Ipomoea triloba L.</td>
<td>little bell</td>
<td>Nat</td>
<td>AA</td>
<td></td>
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<tr>
<td>Momordica charantia L.</td>
<td>wild bitter melon</td>
<td>Nat</td>
<td>O</td>
<td></td>
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<tr>
<td>Cucumis dipsaceus Ehrenb. ex Spach</td>
<td>teasil gourd</td>
<td>Nat</td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>Euphorbia albomarginata Small</td>
<td>rattlesnake weed</td>
<td>Nat</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Euphorbia hirta L.</td>
<td>garden spurge</td>
<td>Nat</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Euphorbia hypericifolia L.</td>
<td>graceful spurge</td>
<td>Nat</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Euphorbia prostrata Aiton</td>
<td>prostrate spurge</td>
<td>Nat</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Euphorbia heterophylla L.</td>
<td>kaliko</td>
<td>Nat</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>Phyllanthus debilis Klein ex Wild.</td>
<td>niuri</td>
<td>Nat</td>
<td>A</td>
<td></td>
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<tr>
<td>Ricinis communis L.</td>
<td>castor bean</td>
<td>Nat</td>
<td>A1</td>
<td></td>
</tr>
<tr>
<td>Acacia farnesiana (L.) Willd.</td>
<td>klu</td>
<td>Nat</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Caesalpinia sp.</td>
<td>wait-a-bit</td>
<td>Nat?</td>
<td>R</td>
<td>&lt;1,2&gt;</td>
</tr>
<tr>
<td>Canavalia cathartica Thours</td>
<td>maunaloa</td>
<td>Nat</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Chamaecrista nictitans (L.) Moench</td>
<td>partridge pea</td>
<td>Nat</td>
<td>C</td>
<td></td>
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<tr>
<td>Crotalaria incana L.</td>
<td>fuzzy rattlepod</td>
<td>Nat</td>
<td>AA</td>
<td></td>
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<tr>
<td>Crotalaria pallida Aiton</td>
<td>smooth rattlepod</td>
<td>Nat</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>Desmanthus pernambucanus (L.) Thellung</td>
<td>virgate mimosa</td>
<td>Nat</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Desmodium inanum DC.</td>
<td>Spanish clover</td>
<td>Nat</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Desmodium trifolium (L.) DC.</td>
<td>---</td>
<td>Nat</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Indigofera hendecaphyla Jacq.</td>
<td>creeping indigo</td>
<td>Nat</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Scientific Name</td>
<td>Common Name</td>
<td>Family</td>
<td>Flora</td>
<td>locally native</td>
</tr>
<tr>
<td>----------------</td>
<td>-------------</td>
<td>--------</td>
<td>-------</td>
<td>---------------</td>
</tr>
<tr>
<td><em>Indigofera suffruticosa</em> Mill.</td>
<td>indigo</td>
<td>LAMIACEAE</td>
<td>Nat O</td>
<td></td>
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<tr>
<td><em>Leucaena leucocephala</em> (Lam.) deWit</td>
<td><em>koa haole</em></td>
<td>LAMUACEAE</td>
<td>Nat C</td>
<td></td>
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<tr>
<td><em>Macroptilium atropurpureum</em> (DC.) Urb.</td>
<td>---</td>
<td>---</td>
<td>Nat O</td>
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<tr>
<td><em>Macroptilium lathyroides</em> (L.) Urb.</td>
<td>cow pea</td>
<td>---</td>
<td>Nat A</td>
<td></td>
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<tr>
<td><em>Mimosa pudica</em> L.</td>
<td>sensitive plant</td>
<td>LAMUACEAE</td>
<td>Nat AA</td>
<td></td>
</tr>
<tr>
<td><em>Senna occidentalis</em> (L.) Link</td>
<td>coffee senna</td>
<td>LAMUACEAE</td>
<td>Nat O</td>
<td></td>
</tr>
</tbody>
</table>
| *Senna surattensis* (N.L. Burm.) H. Irwin & Barneby | *kolomana* | LAMUACEAE | Nat R | <1>
| *Leonotis nepetifolia* (L.) R.Br. | lion’s ear | LAMUACEAE | Nat A | |
| *Cuphea carthagenensis* (Jacq.) Macbr. | tar weed | LAMUACEAE | Nat R | |
| *Abutilon grandifolium* (Wild.) Sweet | hairy abutilon | MALVACEAE | Nat U | |
| *Malvastrum coromandalianum* (L.) Garcke | false mallow | MALVACEAE | Nat A | |
| *Sida acuta* N. L. Burm. | --- | --- | Nat U | |
| *Sida fallax* Walp. | ‘iliima | --- | Ind R | |
| *Sida rhombifolia* L. | Cuba jute | --- | Nat A | |
| *Sida spinosa* L. | prickly sida | --- | Nat AA | |
| *Waltheria indica* L. | ‘uhala | --- | Ind U | |
| *Psidium cattleianum* Sabine | strawberry guava | MYRTACEAE | Nat U | |
| *Psidium guajava* L. | common guava | MYRTACEAE | Nat U | |
| *Rhodomyrtus tomentosa* (Aiton) Hassk. | downy myrtle | MYRTACEAE | Nat R | <1>
| *Syzygium cumini* (L.) Skeels. | Java plum | MYRTACEAE | Nat A | |
| *Boerhavia coccinea* Mill. | false alena | NYCTAGINACEAE | Nat U | |
| *Ludwigia octovalvis* (Jacq.) Raven | primrose willow | ONAGRACEAE | Nat C3 | |
| *Polygala paniculata* L. | bubblegum plant | POLGALACEAE | Nat R2 | |
| *Portulaca pilosa* L. | --- | PORTULACACEAE | Nat U1 | |
| *Portulaca oleracea* L. | pigweed | PORTULACACEAE | Nat U | |
| *Paederia foetida* L. | maile pilau | RUBIACEAE | Nat U | <1>
| *Spermacoce assurgins* Ruiz & Pav. | buttonweed | RUBIACEAE | Nat U | |
| *Cardiospermum halicacabum* L. | balloon vine | SAPINDACEAE | Nat U | |
| *Solanum americanum* P. Miller | pōpolo | SOLANACEAE | Pol R | |
| *Solanum seaforthianum* Andr. | --- | SOLANACEAE | Nat R | <1>
| *Triumfetta* cf. semitriloba Jacq. | Sacramento bur | TILIACEAE | Nat A | <2>
<p>| <em>Lantana camara</em> L. | lantana | VERBENACEAE | Nat U | |</p>
<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Category</th>
<th>Source</th>
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</thead>
<tbody>
<tr>
<td>Stachytarpheta australis</td>
<td>Moldenke</td>
<td>---</td>
<td>Nat A</td>
</tr>
<tr>
<td>Stachytarpheta cayennensis</td>
<td>(Rich.) Vahl</td>
<td>nettle-leaved vervain</td>
<td>Nat U</td>
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</tbody>
</table>

**MONOCOTYLEDONS**

**ALISMATACEAE**

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Category</th>
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</thead>
<tbody>
<tr>
<td>Sagittaria latifolia</td>
<td>Willd.</td>
<td>common arrowhead</td>
<td>Nat R</td>
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</table>

**CYPERACEAE**

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<th>Scientific Name</th>
<th>Common Name</th>
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<tbody>
<tr>
<td>Cyperus cf. diffinis L.</td>
<td>---</td>
<td>Nat R</td>
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<tr>
<td>Cyperus rotundus L.</td>
<td>nut grass</td>
<td>Nat A</td>
<td></td>
</tr>
<tr>
<td>Cyperus polystachyos Rottb.</td>
<td>---</td>
<td>Ind U2</td>
<td></td>
</tr>
<tr>
<td>Fimbristylis dichotoma (L.) Vahl.</td>
<td>---</td>
<td>Ind R</td>
<td></td>
</tr>
<tr>
<td>Fimbristylis milieca (L.) Vahl.</td>
<td>---</td>
<td>Nat O3</td>
<td></td>
</tr>
<tr>
<td>Kylinga brevifolia Rottb.</td>
<td>kili’o’opu</td>
<td>Nat R</td>
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</tbody>
</table>

**LILIACEAE**

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<thead>
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<th>Scientific Name</th>
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<th>Category</th>
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<tbody>
<tr>
<td>Hymenocallis pedalis</td>
<td>Herbert</td>
<td>spider lily</td>
<td>Orn R1 &lt;1&gt;</td>
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**PANDANACEAE**

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<thead>
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<th>Scientific Name</th>
<th>Common Name</th>
<th>Category</th>
<th>Source</th>
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<tbody>
<tr>
<td>Pandanus textorius</td>
<td>S. Parkinson ex Z</td>
<td>hala</td>
<td>Ind R &lt;1&gt;</td>
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</table>

**POACEAE (GRAMINEAE)**

<table>
<thead>
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<th>Scientific Name</th>
<th>Common Name</th>
<th>Category</th>
<th>Source</th>
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</thead>
<tbody>
<tr>
<td>Andropogon virginicus L.</td>
<td>broomsedge</td>
<td>Nat U2</td>
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</tr>
<tr>
<td>Axonopus compressus</td>
<td>(Sw.) P. Beauv.</td>
<td>brd-lvd carpetgrass</td>
<td>Nat R1</td>
</tr>
<tr>
<td>Axonopus fisifolius</td>
<td>(Raddi) Kuhl.</td>
<td>nrw-lvd carpetgrass</td>
<td>Nat U</td>
</tr>
<tr>
<td>Chloris barbata</td>
<td>L. Sw.</td>
<td>swollen fingergrass</td>
<td>Nat O2</td>
</tr>
<tr>
<td>Chloris radiata</td>
<td>L. Sw.</td>
<td>radiate fingergrass</td>
<td>Nat R</td>
</tr>
<tr>
<td>Cymbopogon refractus</td>
<td>(R. Br.) A. Camus</td>
<td>barbwire grass</td>
<td>Nat R &lt;1&gt;</td>
</tr>
<tr>
<td>Cynodon dactylon</td>
<td>(L.) Pers.</td>
<td>Bermuda grass</td>
<td>Nat O</td>
</tr>
<tr>
<td>Dichanthium cf. aristatum</td>
<td>(Poir.) Hubb.</td>
<td>Wilder grass</td>
<td>Nat R &lt;1,2&gt;</td>
</tr>
<tr>
<td>Digitaria ciliaris</td>
<td>(Retz.,) Koeler</td>
<td>Henry’s crabgrass</td>
<td>Nat O</td>
</tr>
<tr>
<td>Digitaria violascens</td>
<td>Link</td>
<td>violet crabgrass</td>
<td>Nat U2</td>
</tr>
<tr>
<td>Echinochloa colonia</td>
<td>(L.) Link</td>
<td>jungle-rice</td>
<td>Nat C &lt;1&gt;</td>
</tr>
<tr>
<td>Echinochloa crus-galli</td>
<td>(L.) P. Beauv.</td>
<td>barnyard grass</td>
<td>Nat O1</td>
</tr>
<tr>
<td>Eleusine indica</td>
<td>(L.) Gaertn.</td>
<td>wiregrass</td>
<td>Nat A</td>
</tr>
<tr>
<td>Eragrostis pectinacea</td>
<td>(Michx.) Nees</td>
<td>Carolina lovegrass</td>
<td>Nat O</td>
</tr>
<tr>
<td>Eragrostis tenella</td>
<td>(L.) P. Beauv. ex Roem. &amp; Schult.</td>
<td>lovegrass</td>
<td>Nat R</td>
</tr>
<tr>
<td>Melinus repens</td>
<td>(Willd.) Zizka</td>
<td>Natal redtop</td>
<td>Nat R &lt;1&gt;</td>
</tr>
<tr>
<td>Oplismenus hirtellus</td>
<td>(L.) P. Beauv.</td>
<td>basketgrass</td>
<td>Nat U2 &lt;1&gt;</td>
</tr>
<tr>
<td>Paspalum conjugatum</td>
<td>P.J. Bergius</td>
<td>Hilo grass</td>
<td>Nat U1 &lt;1&gt;</td>
</tr>
<tr>
<td>Paspalum fimbriatum</td>
<td>Kunth</td>
<td>fimbriate paspalum</td>
<td>Nat U</td>
</tr>
<tr>
<td>Paspalum dilatatum</td>
<td>Poir.</td>
<td>Dallis grass</td>
<td>Nat U2</td>
</tr>
<tr>
<td>Paspalum urvillei Steud.</td>
<td></td>
<td>Vasey grass</td>
<td>Nat U3</td>
</tr>
<tr>
<td>Sporobolis cf. africanus</td>
<td>(Poir.) Robyns &amp;Tournay</td>
<td>smutgrass</td>
<td>Nat A</td>
</tr>
<tr>
<td>Urochloa maxima</td>
<td>(Jacq.) Webster</td>
<td>Guinea grass</td>
<td>Nat AA</td>
</tr>
<tr>
<td>Urochloa mutica</td>
<td>(Forssk.) Nguyen</td>
<td>California grass</td>
<td>Nat AA</td>
</tr>
<tr>
<td>Urochloa distachya</td>
<td>(L.) Nguyen</td>
<td>---</td>
<td>Nat U</td>
</tr>
</tbody>
</table>
Legend to Table 1

Legend to Table 1

Status = distributional status
End = endemic; native to Hawai‘i and found naturally nowhere else.
Ind = indigenous; native to Hawai‘i, but not unique to the Hawaiian Islands.
Nat = naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778, and well-established outside of cultivation.
Orn = exotic, ornamental or cultivated crop; plant not naturalized (not well-established outside of cultivation, at least at this location).
Pol = Polynesian introduction; brought to the Hawaiian Islands before 1778.

Abundance = occurrence ratings for plants on property in August 2014.
R – Rare - seen in only one to three locations and only one or a few plants present.
U - Uncommon – generally rare, but seen in several locations.
O - Occasional - found regularly, but not abundant anywhere.
C - Common - regularly encountered in many areas; some places may be locally abundant.
A – Abundant; present in large numbers in many places in the survey area.
AA – Abundant; a dominant species.

Notes:
<1> Seen only at margins or just off property; associated with forest border.
<2> Plant lacking fruit or flowers and therefore identification may be uncertain.

In all, 115 species of plants were identified from various parts of the survey area. Only 5 of these (or 4.3%) are native Hawaiian species, all of these are considered indigenous (native to Hawai‘i and other Pacific Islands, as opposed to endemic species that are unique to the Hawaiian Islands). All of the remainder (110 species) are naturalized species, save one regarded as an ornamental. Naturalized species are plants introduced into the Hawaiian Islands that have spread on their own and many now dominate the lowlands of all the Islands.

A somewhat unusual aspect of the flora is the abundance of a number of weedy herbaceous dicots in the fields. Species, such as false ragweed (Parthenium hysterophorus), kikānia (Xanthium strumarium), little bell (Ipomoea triloba), fuzzy rattlepod (Crotalaria incana), sensitive plant (Mimosa pudica), and prickly sida (Sida spinosa), are especially abundant covering large areas of relatively recently disturbed pastureland. Guinea grass (Urochloa maxima) and California grass (Urochloa mutica) are dominate in areas where the pasture has not been disturbed recently by tilling or ungulate browsing, and are abundant mixed with the dicot herbs just mentioned. There are pasture areas where other species of grass predominate.

---

1 Includes a vine and a grass, each seen only once, and not identifiable (not included in Table 1).
**Avian Survey Results**

A total of 1070 individual birds of 31 species, representing 23 separate families, were recorded during station counts (Table 2). Of the 31 species detected during station counts, seven are native species. Four of which, Nēnē (*Branta sandvicensis*), Hawaiian Duck (*Anas wyvilliana*), and the Hawaiian sub-species of the Common Gallinule (*Gallinula galeata sandvicensis*) and Black-necked Stilt (*Himantopus mexicanus knudseni*) are listed as endangered under both federal and State of Hawai‘i endangered species statutes, the remaining three native species detected during point counts, Black-crowned Night-Heron (*Nycticorax nycticorax hoactli*), Pacific Golden-Plover (*Pluvialis fulva*), and Wandering Tattler (*Tringa incana*) are indigenous species. The heron is an indigenous resident breeding species and the plover and tattler are indigenous migratory shorebird species. An additional endangered endemic species, Hawaiian Coot (*Fulica alai*) was recorded as an incidental observation while transiting from one count station to another. The remaining 27 avian species detected are alien to the Hawaiian Islands (Table 2).

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>ST</th>
<th>RA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ANSERIFORMES</strong></td>
<td></td>
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</tr>
<tr>
<td>ANATIDAE - Ducks, Geese &amp; Swans</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Anserinae - Geese &amp; Swans</td>
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<td></td>
<td></td>
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<tr>
<td>Hawaiian Goose</td>
<td><em>Branta sandvicensis</em></td>
<td>ER</td>
<td>0.25</td>
</tr>
<tr>
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<tr>
<td><strong>PHASIANIDAE</strong> - Pheasants &amp; Partridges</td>
<td></td>
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</tr>
<tr>
<td>Phasianinae - Pheasants &amp; Allies</td>
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</tr>
<tr>
<td>Black Francolin</td>
<td><em>Francolinus francolinus</em></td>
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<tr>
<td>Red Junglefowl</td>
<td><em>Gallus gallus</em></td>
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<td>1.14</td>
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<tr>
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<td><strong>PELECANIFORMES</strong></td>
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<td>ARDEIDAE - Herons, Bitterns &amp; Allies</td>
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<td></td>
<td></td>
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<tr>
<td>Cattle Egret</td>
<td><em>Bubulcus ibis</em></td>
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</tr>
<tr>
<td>Black-crowned Night-Heron</td>
<td><em>Nycticorax nycticorax hoactli</em></td>
<td>IR</td>
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</tr>
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<td>RALLIDAE - Rails, Gallinules and Coots</td>
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<td>CHARADRIIDAE</td>
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<td>Lapwings &amp; Plovers</td>
<td>Charadriinae - Plovers</td>
<td>Wandering Tattler</td>
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<td>SCOLOPACIDAE</td>
<td>Tringa incana</td>
<td>Black-necked Stilt</td>
</tr>
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<td>Sandpipers, Phalaropes &amp; Allies</td>
<td>Scolopacinae - Sandpipers &amp; Allies</td>
<td>Pacific Golden-Plover</td>
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<tr>
<td></td>
<td>SCOLOPACIDAE</td>
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<td>Wandering Tattler</td>
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<td>COLUMBIFORMES</td>
<td>COLUMBIDAE</td>
<td>Columba livia</td>
<td>Rock Pigeon</td>
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<td>Pigeons &amp; Doves</td>
<td>Streptopelia chinensis</td>
<td>Spotted Dove</td>
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<td></td>
<td>Geopelia striata</td>
<td>Zebra Dove</td>
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<td>STRIGIFORMES</td>
<td>TYTONIDAE</td>
<td>Tyto alba</td>
<td>Barn Owl</td>
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<td>PSITTACIDAE</td>
<td>Psittacula krameri</td>
<td>Rose-ringed Parakeet</td>
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<td></td>
<td>Lories Parakeets, Macaws &amp; Parrots</td>
<td>Psittacinae - Typical Parrots</td>
<td>Rock Pigeon</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Japanese Bush-Warbler</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Japanese White-eye</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chinese Hwamei</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>White-rumped Shama</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Northern Mockingbird</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Common Myna</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Red-crested Cardinal</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Northern Cardinal</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>Western Meadowlark</td>
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<td>PASSERIFORMES</td>
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<td>Sky Lark</td>
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<td>Cettia diphone</td>
<td>Japanese Bush-Warbler</td>
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<tr>
<td></td>
<td></td>
<td>Zosterops japonicus</td>
<td>Japanese White-eye</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Garrulax canorus</td>
<td>Chinese Hwamei</td>
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<tr>
<td></td>
<td></td>
<td>Copsychus malabaricus</td>
<td>White-rumped Shama</td>
</tr>
<tr>
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<td>Mimidae - Mockingbirds &amp; Thrashers</td>
<td>Northern Mockingbird</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mimus polyglottos</td>
<td>Common Myna</td>
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<tr>
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<td>Thraupidae - Starlings</td>
<td>Red-crested Cardinal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thraupidae - Tanagers</td>
<td>Northern Cardinal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thraupidae - Starlings</td>
<td>Western Meadowlark</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thraupidae - Starlings</td>
<td>Western Meadowlark</td>
</tr>
</tbody>
</table>
Avian diversity and densities were in keeping with the location of the property and the habitats presently on the site. Four species, Zebra Dove (*Geopelia striata*), Cattle Egret (*Bulbucus ibis*), Common Myna (*Acridotheres tritis*) and Japanese White-eye (*Zosterops japonicus*) accounted for 52% of all birds recorded during station counts. The most commonly recorded species was Zebra Dove, which accounted for 18 percent of the total number of individual birds recorded. An average of 38 individual birds was recorded per station count; a number that is relatively high for a lowland site on Kaua‘i.

**Mammalian Survey Results**

We recorded six terrestrial mammal species while on the site (Table 3). A small herd of cows (*Bos taurus*) were seen within a paddock on the east side of the property. Flocks of recently shorn sheep were present within the Taro farm, which is located within the project site, but is not part of this project. All of the other species detected are detailed in Table 3.

No mammalian species proposed for listing, or listed as endangered or threatened under either federal or state of Hawai‘i endangered species statutes, was recorded during the course of this survey (HDLNR 1998; USFWS 2014a).
<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>ST</th>
<th>Detection Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>RODENTIA - Gnawers</td>
<td>MURIDAE - Old World Rats &amp; Mice</td>
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<td></td>
</tr>
<tr>
<td>European house mouse</td>
<td><em>Mus musculus domesticus</em></td>
<td>A</td>
<td>V</td>
</tr>
<tr>
<td>CARNIVORA - Flesh Eaters</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Domestic dog</td>
<td><em>Canis f. familiaris</em></td>
<td>A</td>
<td>V, Au, Tr, Sc</td>
</tr>
<tr>
<td>House cat</td>
<td><em>Felis catus</em></td>
<td>A</td>
<td>V, Tr, Sc</td>
</tr>
<tr>
<td>ATRIODACTYLA - Even-Toed Ungulates</td>
<td>SUICIDAE - Old World Swine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pig</td>
<td><em>Sus s. scrofa</em></td>
<td>A</td>
<td>V, Au, Tr, Sc</td>
</tr>
<tr>
<td>BOVIDAE- Hollow-horned Ruminants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic cattle</td>
<td><em>Bos taurus</em></td>
<td>A</td>
<td>V, Au</td>
</tr>
<tr>
<td>Domestic sheep</td>
<td><em>Ovis aries</em></td>
<td>A</td>
<td>V, Au</td>
</tr>
</tbody>
</table>

**Legend to Table 3**

ST = Status  
A = Alien – Introduced to the Hawaiian Islands by humans  
V = Visual – Species seen  
Au = Audio – Species heard  
Tr = Tracks – Species tracks seen  
Sc = Scat – Species droppings seen

**Aquatic Features**

The project area represents bottom-land of upper Māhā‘ulepū Valley; the elevation from the upper pastureland to the lower end representing only about a 20-meter drop, nearly half of which occurs before upper Māhā‘ulepū Road. The valley is fed by several intermittent streams coming off the south slope of the Hā‘upu Ridge between Kāmaulele and Hā‘upu peaks. These normally dry streams feed onto the valley floor, converging at around the 34-meter elevation. Through the upper pastureland, the streams become man-made ditches, incised to a depth of 2-3 meters. At the time we visited, the branch off Kāmaulele had seeps in the bed starting a short distance up from the convergence. Below the convergence, slow moving water is present in a man-made channel running through the project site. The ditch extends southward off the property, passing under lower Māhā‘ulepū Road.
A second ditch parallels to the west the one described above. This second ditch originates in the vicinity of a pond in an area of water wells in the upper west side of the valley. We did not establish the source of the water in this ditch, but the ditch contains water and extends south, passing beside an agricultural operation that includes kalo lo‘i (taro fields), from which it receives additional flow. This ditch then joins a larger ditch known as Mill Ditch (USGS, 1996) carrying water flowing from west to east across the valley within the project area. Mill Ditch turns southward near the center of the valley, passes under Māhā‘ulepū Road, and some 460 meters south, joins the first ditch coming down the valley. The two become Waiopili Ditch, with an outlet at Māhā‘ulepū Beach. Mill Ditch is actually receiving water from a pipe located adjacent to the west side of Māhā‘ulepū Road. Another small intermittent stream enters the project property nearby. This stream originates in a small valley called Kalapa, and is marked by a boulder bed where it crosses under Māhā‘ulepū Road, becoming a dry ditch through the pasture to Mill Ditch.

An old agricultural ‘auwai, called Waitā Reservoir Ditch once brought water from Waitā Reservoir into the upper part of the valley, feeding Māhā‘ulepū Reservoir (off property to the northwest) and wrapping around the upper valley and ending near Pu‘u Keke on the east side close to Waiopili Stream. This ‘auwai is abandoned and no longer functional.

A second ‘auwai extends from Māhā‘ulepū Reservoir to the southwest, paralleling Waitā Reservoir Ditch at a slightly lower elevation (and flowing water in the opposite direction). This ‘auwai is also clearly abandoned and non-functional. An interesting feature associated with this supply ditch is a large, six-sided concrete pipe that fed water into the small reservoir on property (“pond”). Inscribed on a concrete support column for this pipe is “THAIN 10-4-73”.

Spread across the pastures on the valley floor are numerous straight agricultural ditches that serve the purpose of draining runoff from various pasture areas. These were nearly all dry during our survey, and the network was not fully explored, nor was it determined how these presently all interconnect. Presumably these drain eventually into one of the three water-filled features on the property described above.

Many of the aquatic features just described are shown on the USFWS National Wetlands Inventory (NWI) and assigned codes that describe the habitat type presumed by the Inventory (most information in the NWI was derived from aerial photographs and maps, not field investigations; USFWS, 2014b). All of the water ditches on the property (and the ‘auwai around the margin of the valley floor) are coded “R4SBCx”, which represents: intermittent (seasonally flooded) flowing water, in an excavated channel. An exception is the ditch (and channel upslope) directing stream flow off Kāmaulele, which is coded R3RBH: an upper perennial stream with a rock bottom. Characterization as an interrupted
perennial stream is possible given that the stream arises in two branches over 300 meters above sea level, but unlikely.

Three agricultural ponds or reservoir features are coded PUBh, (permanently flooded, man-made pond with sediment bottom). Māhā'ulepū Reservoir is the largest, but located entirely off property. Two reservoirs are indicated within the project area, but one may no longer exist (could not be located in the field) and the other is the small pond in the well area on the upper northwest side. The latter is described by Tom Nance Water Resource Engineering (TNWRE, 2016) as the sump at "Well 14 Battery" and appears to be disconnected from even the local groundwater.

2 The state perennial streams inventory (HCPSU, 1990) lists no streams for Māhā'ulepū, but lists a "Kipu Kai Stream" for Kaua‘i in this general area (ID No. 2-3-01, Lihue Quadrangle). The newer, watershed atlas (Parham et al., 2008) lists Mahaulpeu as a non-perennial stream, assigning the watershed code: 23011. The watershed delineation report (GDSI, 1994) separates Kipu Kai and Mahaulepu watersheds, although mapping them as a single watershed. Physically, the two valleys are quite distinct (and separated by intervening Aweoweonui Gulch).
Figure 4 - Map of aquatic features in the project vicinity in Māhā‘ulepū Valley.
Discussion

Botanical Resources

The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur here. The results of our survey substantiate this prediction. The low percentage (4%) of native plant species is an indication that because of constant disturbances, only species adapted to such conditions can survive, and with but a few exceptions, these adapted species are non-natives in the lowlands of the Hawaiian Islands.

A search of Bernice P. Bishop Museum Herbarium records conducted by Anita Manning, yielded 91 entries for “Mahaulepu”. The majority of the natives in the listing were collected along the coast or “Haupu Ridge” or “Puu Pihakapu”. The list of rare native species is impressive. Though the locations are roughly associated with Māhāʻulepū Valley, they represent environments vastly different from those of the upper valley floor (project area). Indeed, all of the plants of interest were collected in either coastal dunes, exposed coastal sites, or steep, rocky cliffs at elevations well above the project. All species in the collection with locations likely to be similar to, if not in, the project pasture lands, are non-native species.

Avian Resources

The findings of the avian survey are consistent with the location of the property, and the habitat present on the site and with at least two relatively recently conducted faunal surveys conducted on lands close to the study site (Guinther and David, 2009; David, 2013; David and Guinther, 2013). During the course of this survey we recorded 31 avian species during point counts, with a further species being recorded as an incidental observation while transiting between count stations. Of the 32 species detected on the site five; Nēnē, Hawaiian Duck, Common Gallinule, Black-necked Stilt and Hawaiian Coot are native endemic species or sub-species all of which are currently listed as endangered species under both federal and State of Hawai‘i endangered species statutes (Table 2). Additionally three other species recorded; Black-crowned Night-Heron, Pacific Golden-Plover, and Wandering Tattler are native indigenous species. The Black-crowned Night-Heron is an indigenous resident water obligate species and the plover and tattler are indigenous migratory shorebird species which nests in the high Arctic during the late spring and summer months, returning to Hawai‘i and the tropical Pacific to spend the fall and winter months each year. They usually leave Hawai‘i and return to the Arctic in late April or the very early part of May. The remaining 24 avian species detected are alien to the Hawaiian Islands (Table 2).

Four of the five endangered birds recorded during the course of this survey were concentrated in or close to the taro cultivation site located on the south-central part of the property, though not part of the proposed dairy operations, were waterbirds: Hawaiian Duck, Common Gallinule, Black-necked Stilt and Hawaiian Coot (Figure 5). Nēnē were also
recorded close to the taro loi, but were also encountered at other locations on the property, and could in future be expected to use resources anywhere on the site with fresh grass. The majority of the Hawaiian Ducks recorded were seen either on the Māhāʻulepū Reservoir located outside of the dairy operations area on the northeast corner of the property (Figure 1), or flying over the greater site or within the taro loi.

Although not detected during this survey, the endangered Hawaiian Petrel (*Pterodroma sandwichensis*), and the threatened endemic sub-species of the Newell’s Shearwater (*Puffinus auricularis newelli*) have been recorded over-flying the general project area between April and the end of November each year (David, 2013; David and Guinther, 2013; Morgan et al., 2003, 2004; David and Planning Solutions 2008). Additionally, the Save Our Shearwaters Program has recovered both species from the general Koloa area on an annual basis over the past three decades (Morgan et al., 2003, 2004; David and Planning Solutions, 2008; Save our Shearwater Program, 2013).

The petrel is listed as endangered, and the shearwater as threatened under both Federal and State of Hawai‘i endangered species statutes. The primary cause of mortality in both Hawaiian Petrels and Newell’s Shearwaters is thought to be predation by alien mammalian species at the nesting colonies (USFWS 1983, Simons and Hodges 1998, Ainley et al., 2001). Collision with man-made structures is considered to be the second most significant cause of mortality of these seabird species in Hawai‘i. Nocturnally flying seabirds, especially fledglings on their way to sea in the summer and fall, can become disoriented by exterior lighting. When disoriented, seabirds can collide with manmade structures, and if they are not killed outright, the dazed or injured birds are easy targets of opportunity for feral mammals (Hadley 1961; Telfer 1979; Sincock 1981; Reed et al., 1985; Telfer et al., 1987; Cooper and Day, 1998; Podolsky et al. 1998; Ainley et al., 2001; Hue et al., 2001; Day et al 2003).

**Mammalian Resources**

The findings of the mammalian survey are consistent with the location of the property and the habitat currently present on the site. We did not record Hawaiian hoary bats overflying the site. Hawaiian hoary bats are widely distributed in the low to mid-elevation areas on the Island of Kaua‘i, and have been documented in and around almost all areas that still have some dense vegetation (Tomich, 1986; USFWS 1998, David, 2014).

Then only rodent species detected during this survey were several European house mice. (*Mus musculus domesticus*). It is probable that one or more of other three established alien muridae found on Kaua‘i, roof rat (*Rattus r. rattus*), brown rat (*Rattus norvegicus*), and possibly Polynesian rats (*Rattus exulans hawaiiensis*) use various resources found within the general project area. All of these introduced rodents are deleterious to native ecosystems and the native faunal species dependent on them.
Figure 5 – Farm Map showing existing Taro Farm and proposed Dairy Farm Infrastructure
Potential Impacts to Protected Species

Botanical

No protected botanical species (for example, threatened or endangered species under state and federal statutes; USFWS, 2014; HDLNR, 1998) occur on the project property. Thus the construction and subsequent operation of the proposed dairy is not expected to result in deleterious impacts to any protected botanical species. Although possibly some areas around the valley margin might have once supported a population of ‘ohia (*Sesbania tomentosa*)—a species of shrub that is listed as endangered—the highly disturbed nature of the valley floor precludes the possibility of any such population surviving after the start of agriculture here. Today, this plant is much more likely to be found very close to the ocean shore or inland where dunes prevail.

Waterbirds

Four endangered waterbird species, Hawaiian Duck, Common Gallinule, Black-necked Stilt and Hawaiian Coot were recorded on the property. The principal potential impacts that the development and operation of the proposed dairy farms on the site poses to these four species fall can be broken down into those potentially associated with construction activities and those associated with dairy farm operations following build-out.

During construction especially during clearing and grubbing phases of the project, clearing vegetation, opening up and clearing of agricultural irrigation features and the construction and/or upgrading of roadways within the farm has the potential to disturb nesting waterbirds, nests, eggs and young. Controls should be put in place to avoid deleterious interactions between endangered waterbirds and construction equipment, vehicles and construction personnel. Waterbirds disturbed when nesting may abandon their nest, eggs and to a lesser degree chicks. Increased vehicular traffic associated with construction activities also increases the risk of birds being run over or hit by vehicles, within the project site.

Nēnē

Nēnē were seen on the site, and in discussions with DOFAW biologists we were told that they are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kōloa area (David, 2013; David and Guinther 2013), and the habitat present on parts of the site are suitable for Nēnē nesting. Potential impacts to this species are similar to those discussed for waterbirds. With the singular difference that Nēnē could potentially nest anywhere on the site which has adequate shrubby or rank grass under which they can build a nest. Unlike the four waterbirds discussed above Nēnē often nest relatively far from water.
Seabirds
The principal potential impact that construction of the proposed dairy farms poses to protected seabirds is the increased threat that birds will be downed after becoming disoriented by lights associated with the project during the nesting season. The two main ways that outdoor lighting could pose a threat to these nocturnally flying seabirds is if, 1) during construction it is deemed expedient, or necessary to conduct nighttime construction activities, and 2) following build-out, the potential operation of streetlights or security lighting.

Hawaiian hoary bats
It is likely that Hawaiian hoary bats overfly the project area on a seasonal basis. The principal potential impact that the development of the proposed dairy farms poses to bats is during the clearing and grubbing phases of construction as vegetation is removed. The removal of vegetation within the project site may temporarily displace individual bats, which may use the vegetation as a roosting location. As bats use multiple roosts within their home territories, the potential disturbance resulting from the removal of the vegetation is likely to be minimal. During the pupping season, females carrying their pups may be less able to rapidly vacate a roost site as the vegetation is cleared. Additionally, adult female bats sometimes leave their pups in the roost tree while they forage. Very small pups may be unable to flee a tree that is being felled. Potential adverse effects from such disturbance can be avoided or minimized by not clearing woody vegetation taller than 4.6 meters (15-feet), between June 1 and September 15, the period in which bats are potentially at risk from vegetation clearing. With that said, there are almost no suitable roost trees within the proposed project site, thus it is not expected that the project will result in deleterious impacts to this listed mammalian species.

Recommendations

Construction
During the construction phase of the project we recommend the following minimization measures and training be implemented to ensure that construction activities do not result in deleterious impacts to the trust faunal species that may be encountered during construction.

- Develop an endangered species awareness training module
- Endangered Species Identification with photographs and description of habitats and areas on the property where species are most likely to occur and/or nest
- Construction workers should undergo endangered species awareness training prior to starting work on the project
- 15 MPH Speed limit signs posted and enforced on all roads within the project
- No pets allowed on property – especially dogs and cats
• Closed trash receptacles for food and beverage containers, and disposal of same, should be provided

• No feeding of birds

• No feeding or watering of feral cats and dogs

• Specified construction personnel parking areas

• Construction materials and construction equipment parking and maintenance areas surveyed and delineated

• These requirements should be included as special Construction BMP contract provisions

• Immediately prior to construction activities Surveys for nesting waterbirds and Nēnē should be conducted by a qualified biologist, if nesting activity is identified within 100 feet of proposed construction activity, construction activity should be halted until nesting activity has ended, or consultation with the state and federal wildlife regulators should be initiated to determine the best course of action.

• If nighttime construction activity or equipment maintenance is proposed during the construction phases of the project, all associated lights should be shielded, and when large flood/work lights are used, they should be placed on poles that are high enough to allow the lights to be pointed directly at the ground.

• If streetlights or exterior facility lighting is installed in conjunction with the project, it is recommended that the lights be shielded to reduce the potential for interactions of nocturnally flying seabirds with external lights and man-made structures (Reed et al., 1985; Telfer et al., 1987).

**Dairy Operations**

Following build-out and the start of Dairy operations we recommend that the following recommendations be implemented:

• Develop an Endangered Species Protection Plan, the plan would include all of the topics outlined above. The material would be presented in more detail and with the rationale for why following those BMP’s is necessary to ensure that Dairy operations do not result in deleterious impacts to protected wildlife. The Plan would also include these additional topics:

• Endangered Species Identification with photographs and description of their habitats, and likely areas on the property where they are most likely to occur and/or to nest
• Employee endangered species training, provided both in writing and as a PowerPoint presentation for use in training new personnel and annual updates of training

• Predator control program

• Downed seabird, and injured waterbird response protocols

**Critical Habitat**

There is no federally delineated Critical Habitat for any species present on or adjacent to the project area. Thus the development and operation of the proposed project will not result in impacts to federally designated Critical Habitat. There is no equivalent statute under State law.
**Glossary**

Alien – Introduced to Hawai‘i by humans
Commensal – Animals that share human food and lodgings, such as rats, mice cats and dogs.
Crepuscular – Twilight hours
Endangered – Listed and protected under the Endangered Species Act of 1973, as amended (ESA) as an endangered species
Endemic – Native to the Hawaiian Islands and unique to Hawai‘i
Indigenous – Native to the Hawaiian Islands, but also found elsewhere naturally
Mauka – Upslope, towards the mountains
Muridae – Rodents, including rats, mice and voles, one of the most diverse families of mammals
Naturalized – A plant or animal that has become established in an area that it is not indigenous to
Nocturnal – Night-time, after dark
‘Ōpe‘ape‘a – Endemic endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*)
Pelagic – An animal that spends its life at sea – in this case seabirds that only return to land to nest and rear their young
Phylogenetic – The evolutionary order that organisms are arranged by
Ruderal – Disturbed, rocky, rubbishy areas, such as old agricultural fields and rock piles
Sign – Biological term referring to tracks, scat, rubbing, odor, marks, nests, and other signs created by animals by which their presence may be detected
Threatened – Listed and protected under the ESA as a threatened species.

**Acronyms**

AMSL – Above mean sea level
CAFO - Concentrated Animal Feeding Operation
HDF - Hawaii Dairy Farms LLC
HDLNR – Hawai‘i State Department of Land & Natural Resources
DOFAW – Division of Forestry and Wildlife
ESA – Endangered Species Act of 1973, as amended
GNSS – Global Navigation Satellite System (formerly as Global Positioning System), an accurate worldwide navigational and surveying facility based on the reception of signals from an array of orbiting satellites.
MSL – Mean sea level
NDI - USFWS National Wetlands Inventory
NPDES - National Pollutant Discharge Elimination System
TMK – Tax Map Key
USFWS – United State Fish & Wildlife Service
USGS – United States Geological Survey
UTM – Universal Transverse Mercator System, a standardized mapping coordinate system that uses grids to identify the specific location of any feature on the surface of the planet
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APPENDIX B

CATTLE MANURE-RELATED INSECT SPECIES AND BIOLOGICAL CONTROLS FOR HAWAIʻI DAIRY FARMS MĀHĀʻULEPŪ, KAUAʻI, HAWAIʻI

STEVEN LEE MONTGOMERY, PH. D.
Cattle Manure-related Insect Species and Biological Controls for Hawai‘i Dairy Farms, Māhā’ulepū, Kaua‘i, Hawai‘i

Prepared by:
Steven Lee Montgomery, Ph. D., Consulting Biologist
94-610 Palai Street, Waipahu, Hawai‘i 96797-4535

Submitted to: Group 70 International
For: Hawai‘i Dairy Farms, LLC

January 29, 2016
Table of Contents

Introduction 1
Executive Summary 1
General site description 4
Survey methods
  Previous surveys and literature search 5
  Fieldwork schedule 5
  Survey methods 6
  Survey limitations 10
Survey results: Discussion
  Vertebrates 11
  Arthropods 14
  Invertebrates not present: Native species 20
  Invertebrates not present: manure-related 21
  Potential Impacts of control measures 24
  Medically important species 25
Recommendations 28
Acknowledgments 34
Nomenclature; Abbreviations 35
Glossary 36
Literature cited 37

Tables
Table 1. Wildlife present at Māhā‘ulepū, Kaua‘i, associated with manure 12
Table 2. Additional invertebrates likely to occupy cow manure. 21
Table 3. Fly enemies not established on Kaua‘i 32

Figures
Figure 1. Site of proposed Hawai‘i Dairy Farms cover
Figure 2. Map showing general location of proposed project, Island of Kaua‘i 1
Figure 3. Life cycle of fly (DuPonte & Larish 2003) 1
Figure 4. Map overview of Hawai‘i Dairy Farms, Māhā‘ulepū, Kaua‘i 3
Figure 5. Clear running ditch habitat 4
Figure 6. Slow moving ditch habitat 4
Figure 7. Map showing location of ditches with water 6
Figure 8. Beef cattle provided manure samples 7
Figure 9. Map showing manure collection site 8
Figure 10. MultiLure traps have proven record of results 9
Figure 11. Baited traps were placed near resting location of cattle 9
Figure 12. Manure disrupted by bird scavenging 11
Figure 13. Argiope appensa, Orb weaver spider 14
Figure 14. Comparative size of Stomoxys calcitrans and Sepsis biflexuosa biflexuosa 15
Figure 15. Size of Lucilia sericata 15
Figure 16. Lampides boeticus, bean butterfly on manure 16
Figure 17. Dung beetles disrupt manure by burrowing, burial, eating 17
Figure 18. Ochetellus glaber ants bite off small pieces of tissue 18
Figure 19. Red dragonfly 19
Figure 20. Pink phase dragonfly 19
Figure 21. Size comparison fly pupa and adult wasp 23
Figure 22. Adult wasp laying egg in fly pupa; adult wasp emerging from fly pupa 23
Figure 23. Honey bees at water spigot 25
Figure 24. Sonoran carpenter bees 26
Figure 25. Polistes exclamans, Paper wasp 26
Figure 26. Vespula pensylvanica, Yellow-jacket wasps 27
Figure 27. Night collection example 29
Figure 28. Cross section in cow manure showing use by dung beetles 33
INTRODUCTION
This report summarizes the findings of an insect survey conducted at and near the proposed site of Hawai‘i Dairy Farms (HDF), Māhā‘ulepū, Kaua‘i, (Figure 2, 4) in September 2014.

The primary purpose of the survey was to determine the presence or absence of species associated with the manure of cattle and of the parasites and predators that control them. The survey also was designed to provide information to assist in planning a control program for problem species. The survey also notes species that could be injurious to humans or cattle and was alert to the presence of any Endangered or Threatened species.

Executive Summary
Most insects are obligatorily attached to specific food sources, prey or host plants, being able to use only that source. Those relationships are ancient and intertwined. The amount of food and the levels of predators and parasites determine the abundance or scarcity of species. Those feeding behavior patterns are part of an inter-dependent web in nature, and the basis of integrated pest management (IPM). Knowledge of this web has been used for many decades in Hawai‘i to naturally control alien pest species associated with cattle manure by disrupting reproduction with appropriate means at each part of the life cycle. Birds, spiders, or dragonflies eat adult insects. Ants attack eggs or larva. Birds eat the larva or pupa. Dung beetles minimize food for larvae. Micro-wasps parasitize the larva and pupa.
Survey, Māhāʻulepū, Kauaʻi, Hawaiʻi

Executive Summary continued

The manure of near-by beef cattle was monitored in the field and in the lab to observe that predator / prey web of control. Known manure-related species such as the “stable fly” were present, but so were some of the known control species such as dung beetles. Birds and other vertebrates disturb the dung, eat pest species and make breeding by pests much less successful. Disturbance also exposes the pests to predation by other predator insects. Spiders and dragonflies, apex predators on flying adult pest species also were present. (See pages 11, 14, 18-19)

This web of control is a proven, successful strategy. We experienced it personally when Feb 22-28, 2011, we assisted Hawaiʻi film makers Moana Productions in site location and animal wrangling for a dairy promotion using the pastures and animals of Kohala’s Cloverleaf Dairy. (This was for a continental dairy taking advantage of Hawaii’s mild climate to film in winter for spring showing at home.) We were in the cow paddocks and open fields with the cattle during the day and a crew of 20 ate lunches in an open tent most days in the fields. Flies were not a nuisance or even noted at all on the food or when we were working in the fields. The ongoing, natural web of predator / prey relationships kept pest species under control.

Some of the manure-related insect predatory species long established in the Hawaiian Islands are present elsewhere on Kauaʻi, but not now present near the proposed HDF site. Recommendations are made on their introduction to the site. Other species are not known on Kauaʻi, thus their introduction from other Hawaiian islands is recommended. Together these predatory species hold fly species in check. None of the predator insects have any history of attacking native Hawaiian insects. (See page 24)

The project site does have species that could be injurious to humans or cattle, but none are exclusively associated with cattle. All are common throughout the island chain, have been present on Kauaʻi for many decades, and are seen in virtually every survey we do. Cautions and controls are discussed. (See page 25)

Historically, no native invertebrates of any species are known to be attracted to manure of large herbivores. The field survey around the site confirmed native invertebrates were NOT attracted to manure of nearby beef cattle. This survey showed no evidence of lava tubes (caves) that would support the endangered Kauaʻi cave wolf spider or cave amphipod. Neither the Blackburn’s sphinx moth nor its host plants were observed. The project location does not provide any habitat for Kauaʻi species of native Hawaiian pomace flies listed as endangered (Drosophila musaphilia & D. sharpi) and these have no historical sightings within many miles of the HDF site. (See page 20)
Figure 4. Site of proposed Hawai‘i Dairy Farm, Kaua‘i (Provided by Group 70)
GENERAL SITE DESCRIPTION

The proposed project site at Māhāʻulepū Valley, Kauaʻi, comprises 557 acres, excluding the existing kalo loʻi (taro pond) operation at the makai end (Figure 4). The land is largely in grass with a variety of weedy species\(^1\) (e.g., castor bean, koa haole) along the sides of gravel roads. The grazing area slopes from 150 ft. to 60 ft. along Māhāʻulepū Road at the makai end of the site.

Although most of the ditches running mauka-makai were dry during the September 2014 survey, one small ditch was running with clear water (Figure 5) and a parallel ditch had some slowly moving water and standing water (Figure 6).

\(^1\) Technical terms are defined in the Glossary, page 36.
INVERTEBRATE SURVEY METHODS

Previous Surveys and Literature Search

Prior to the field survey, a search was made for publications relating to invertebrates associated with this particular site or with nearby sites. A search was made for other projects in the general area that generated an Environmental Assessment or Environmental Impact Statement filed at the web site of the State’s Office of Environmental Quality Control (2014). This review did not show any previous invertebrate surveys in the area. The results of recent avian-mammalian and botanical surveys of the project area by David and Guinther (2014) were helpful in preparing for this study. Searches were made in the University of Hawai’i and Bishop Museum library catalogs and in the University of Hawai’i, Hamilton Library’s Hawai’i-Pacific Journal Index (2014). Searches were made for publicly available articles mounted on the web through Google Scholar.

Most helpful were searches in the Bishop Museum’s Natural Sciences databases (2014) and the University of Hawai’i Insect Museum “holdings” database (2014).

As the record of Hawaii’s economic entomology activity for over 100 years, the journal, Proceedings of the Hawaiian Entomological Society, was very useful.

Fieldwork

The field survey was conducted in September 2014, beginning with a general assessment of terrain and habitats. Surveying efforts were conducted at various times of day, a technique that is vital for a thorough survey. See Figure 9 for manure survey location.

Fieldwork schedule
September 15, 2014: 4 hours; Site examination, orientation, general surveying, baiting
September 16, 2014: 7 hours; General surveying, baiting, sample collection

Lab-rearing schedule
September 17-October 13, 2014

Manure collected in the field (Figure 9) was observed in lab to rear any dung associated species. Specimens emerging in the lab are recorded in Table 1 with the field collected specimens.
INVERTEBRATE SURVEY METHODS: continued

Survey Methods
Wandering transects were walked across pastures. Spot surveys were made at both a shallow, flowing ditches and at more slowly moving water that included seepage from the kalo ponds of W.T. Haraguchi Farm, Inc. (Killermann 2014).

Figure 7. Entry point for ditch with flowing water (A) and slow moving water (B) (Group 70 2015)
INVERTEBRATE SURVEY METHODS: continued

The major focus of the survey was on the fresh and dry manure generated by beef cattle (Figure 8) at the adjacent pasture for Mahaulepu Cattle Co. (Figure 9).

The following methods for invertebrate surveying were used as appropriate to the terrain, botanical resources, and target species.

**Visual observation / examination of manure**

At all times, the survey was alert for evidence of any animal presence or interaction with manure. Visual observations provide valuable evidence and provide a cross check that extends the reach of structured sampling techniques. Visual observation also included examination of manure and decaying matter, turning over rocks, dead wood, and other debris.

Daily observations were made of manure samples returned to the lab. Emergence of various species differs based on time from egg to adult. Samples were monitored for more than 21 days, sufficient for most species to emerge.
Figure 9. Location of Mahaulepu Cattle Co. animals (*) where manure was collected for rearing of dung associated species in lab. (map Group 70 2015)
INVERTEBRATE SURVEY METHODS: continued

Baited traps

Baited Multi-Lure traps (Figure 10) were deployed near a resting spot favored by Mahaulepu Cattle Co. animals. On September 15, fresh manure was placed in traps suspended above the ground and directly adjacent to the location where the cattle had deposited manure (Figure 11). No flies came to the traps in 8 hours. On September 16, the traps were moved closer to the ground, but again, no flies came to the traps. The flies stayed on the manure on the ground.

Food scraps were left in the open about 5 yards from the paddock where the Mahaulepu Cattle Co. animals congregated for water and 10 yards from the nearest manure. No flies came to the food scraps, the manure being their preferred ecological niche.

Sweep net

This is the most common method of collecting flying and perching insects. A fine mesh net was swept across plants, manure piles, etc. to collect flying insects. Net contents were transferred into a holding container.
INVERTEBRATE SURVEY METHODS: continued

Survey Limitations / Conditions
The ability to form an advisory opinion is conditioned in the following ways:

Seasons
Weather and availability of food sources play a role in any survey of invertebrates. Arthropod breeding responds to access to food sources for the young and the on-going cattle operation assured a steady source of manure to host the pest / predator population. Nevertheless, monitoring at a different time of the year might produce a longer or slightly different invertebrate list.

Weather
Weather was favorable for surveying during each field day, although relatively warm. Water was present in two ditches, although several were dry.

Limited duration
It is possible that surveying for a longer period of time might enlarge the list of species. To balance that possibility, manure samples were collected and returned to the lab, monitored, and species collected as they emerged. This helped the survey provide a more accurate review of the species present. Nevertheless, it is likely some species present on Kaua’i were not captured, and may later come to manure at HDF. These are noted below in Table 2: Invertebrates known on Kaua’i but not present (page 21).

Selectivity
The survey was focused on finding alien arthropod species present in the area having a relationship to operation of a dairy (Table 1). No attempt was made to document the many non-dairy related alien invertebrate species that might be present in any open field area in Hawai’i (e.g., cabbage butterfly). No attempt was made to document endemic and indigenous Hawaiian invertebrate species, although they were reported when seen. No habitat or host plants of endangered and threatened species were observed.

Diet of Animals
Although the Mahaulpue Cattle Co. animals are fed with pasture grass, as will be the HDF animals, it is anticipated there will be supplemental feeding at the milking site. This diet addition may change the composition of the manure in ways we can not anticipate. This could change the attractiveness of the manure to various invertebrate species already on Kaua’i, but not now found at the site (page 21, Table 2). The management of feed and implementation of integrated pest management techniques should provide controls in anticipation of this option. In addition to the introduction of known predator species already on Kaua’i and in the island chain (See page 29), diet management can be helpful. A prime example is the dog dung fly, which is known to breed in cow manure in small numbers. This can be reduced by omitting corn from feed. Lee and Toyama (1991) showed female flies preferred laying eggs in dairy cow dung containing the residues of digested ground corn.
DISCUSSION

VERTEBRATES NOTED

Because the feces of chickens, cats, and dogs also provide habitat for pest fly species, the survey was alert for the presence of these animals. Although cats and chickens were observed, neither was seen in numbers that added much food for pest flies.

Feral pigs (Sus scrofa) were noted on HDF property. Their rooting is currently one of the factors breaking up manure of the Mahaulepu Cattle Co. animals. It is assumed, however, that the feral animals will be removed as a health hazard to the HDF cattle and as destructive to the pastures and water resources.

Several species of birds are present. Many of them feed on seeds and small insects. Numerous manure piles showed signs of being disturbed by birds scratching at, or beaking the pile to find larvae or undigested seeds. (Figure 12) This assists in the breakdown of the piles making them more easily dissolved by sprinklers and more accessible to other colonizing insects that reduce the pile. A disturbed pile also is much less suitable habitat for fly larvae, reducing breeding success.

![Figure 12](image1.jpg) Undisturbed manure (left) contrasted with manure disrupted by dung beetles and birds searching for seeds or larvae (right).

Cattle egrets (Bubulcus ibis) were sighted among the sheep grazing near the kalo field, including a bird riding the back of one member of the flock. The birds were present among the Mahaulepu Cattle Co. animals and in the open fields on HDF lands. In 1959, the original intent in purposefully introducing these birds was, as their name implies, to co-habit with cattle and eat insects associated with the herd. The commonly seen behavior of egrets following large grass mowers mimics their natural behavior of following large animals like cattle to catch insects disturbed by the animals. Their presence is one part of the integrated pest control web.
**SURVEY RESULTS: Cattle related species**

**Table 1: Wildlife present at Māhā‘ulepū, Kaua‘i, associated with manure or manure pests**

<table>
<thead>
<tr>
<th>Species</th>
<th>Common Name</th>
<th>Status</th>
<th>Frequency</th>
<th>Notes / breeding sites</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ARTHROPODA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARACHNIDA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARANEAE</td>
<td>spiders</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Araneidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Argiope appensa</em> (Walckenaer 1841)</td>
<td>orb weaver spiders</td>
<td>Adv</td>
<td>O</td>
<td>multiple webs in Norfolk Is. Pines, road makai property boundary</td>
</tr>
<tr>
<td>Tetragnathidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Tetragnatha mandibulata</em> (Walckenaer, 1841)</td>
<td>long jawed spider</td>
<td>Adv</td>
<td>O</td>
<td>on web over ditches</td>
</tr>
<tr>
<td><strong>INSECTA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COLEOPTERA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scarabaeidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Aphodius lividus</em> (Olivier, 1789)</td>
<td>brown dung beetle</td>
<td>Pur</td>
<td>C</td>
<td>black, common in/under manure pads; 12mm</td>
</tr>
<tr>
<td><em>Onthophagus gazella</em> (Fabricius, 1787)</td>
<td>brown dung beetle</td>
<td>Pur</td>
<td>C</td>
<td>black, common in/under manure pads; 12mm</td>
</tr>
<tr>
<td><strong>DIPTERA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calliphoridae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Lucilia sericata</em> (Meigen, 1826)</td>
<td>greenbottle fly</td>
<td>Adv</td>
<td>C</td>
<td>shiny; 5 to 10 mm</td>
</tr>
<tr>
<td>Muscidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Haematobia irritans</em> (Linnaeus, 1758)</td>
<td>horn fly</td>
<td>Adv</td>
<td>O</td>
<td>slender, gray; 5mm</td>
</tr>
<tr>
<td><em>Stomoxys calcitrans</em> (Linnaeus, 1758)</td>
<td>stable fly</td>
<td>Adv</td>
<td>A</td>
<td>spots on abdomen; common on manure; 6mm</td>
</tr>
<tr>
<td>Sepsidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Sepsis biflexuosa biflexuosa</em> Stobl, 1893</td>
<td></td>
<td>Adv</td>
<td>AA</td>
<td>black, slender flies mass on fresh manure</td>
</tr>
<tr>
<td><strong>HYMENOPTERA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formicidae</td>
<td>wasps, bees, ants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ochetellus glaber</em> (Mayr, 1862)</td>
<td>ants</td>
<td>Adv</td>
<td>C</td>
<td>on fresh manure</td>
</tr>
<tr>
<td>Pheidole megacephala (Fabricius, 1793)</td>
<td>bigheaded ant</td>
<td>Adv</td>
<td>AA</td>
<td>on soil near manure</td>
</tr>
<tr>
<td>Camponotus variegatus</td>
<td>carpenter ant</td>
<td>Adv</td>
<td>U</td>
<td>under dried manure</td>
</tr>
<tr>
<td>Vespidae</td>
<td>common paper wasp</td>
<td>Adv</td>
<td>C</td>
<td>office trailer; empty nest on plains</td>
</tr>
</tbody>
</table>

 Montgomery   January 29, 2016
### Table 1: continued

<table>
<thead>
<tr>
<th>Species</th>
<th>Common Name</th>
<th>Status</th>
<th>Frequency</th>
<th>Notes / breeding sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEPIDOPTERA</td>
<td>butterflies &amp; moths</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lycaenidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Lampides boeticus</em> (Linnaeus)</td>
<td>bean butterfly</td>
<td>Adv</td>
<td>C</td>
<td>flock to minerals at moist soil with urine</td>
</tr>
<tr>
<td>ODONATA</td>
<td>dragonflies; damselflies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coenagrionidae</td>
<td>damselflies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ischnura ramburii (Selys-Longchamps)</td>
<td>Rambur's damselfly</td>
<td>Adv</td>
<td>C</td>
<td>in flight at ditches</td>
</tr>
<tr>
<td>Libellulidae</td>
<td>skimmers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orthemis ferruginea (Fabricius, 1775)</td>
<td>roseate skimmer</td>
<td>Adv</td>
<td>O</td>
<td>in flight near ditches</td>
</tr>
<tr>
<td>Pantala flavescens (Fabricius, 1798)</td>
<td>globe skimmer</td>
<td>Ind</td>
<td>C</td>
<td>adult in flight; proposed Hawai‘i Dairy pastures; naiaed in Mahaululepu Cattle Co.’s water tank</td>
</tr>
<tr>
<td>VERTEBRATA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amphibia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bufonidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Bufo marinus</em> Schneider, 1799</td>
<td>cane toad or bufo</td>
<td>Pur</td>
<td>A</td>
<td>tadpoles in ditches; adults in HDF pastures</td>
</tr>
<tr>
<td>Ranidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rana catesbeiana</td>
<td>bull frog</td>
<td>Pur</td>
<td>U</td>
<td>in ditches</td>
</tr>
<tr>
<td>Aves</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ardeidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Bubulcus ibis</em></td>
<td>Cattle egret</td>
<td>Pur</td>
<td>C</td>
<td>proposed Hawai‘i Dairy pastures</td>
</tr>
<tr>
<td>Phasianidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Nycticorax nycticorax hoactli</em></td>
<td>Black-crowned night-heron</td>
<td>Ind</td>
<td>U</td>
<td>proposed Hawai‘i Dairy pastures / near stream</td>
</tr>
<tr>
<td>Gallus gallus domesticus</td>
<td>Feral chicken</td>
<td>Pur</td>
<td>C</td>
<td>proposed Hawai‘i Dairy pastures</td>
</tr>
</tbody>
</table>

**FREQUENCY = occurrence ratings:**

- **R** Rare: seen in only one or perhaps two locations.
- **U** Uncommon: seen in several locations.
- **O** Occasional: seen with regularity.
- **C** Common: observed numerous times.
- **A** Abundant: found in large numbers.
- **AA** Very abundant: abundant and dominant.

**STATUS:**

- **End** endemic to Hawaiian Islands.
- **Ind** indigenous to Hawaiian Islands.
- **Adv** adventive.
- **Pur** purposefully introduced.
- **?** unknown.
Survey Results: Dairy related species  continued

**INVERTEBRATES NOTED**
**ARTHROPODA**
**ARANEAE** (spiders)
Spiders are a part of the natural web of control system against flying insects.

*Argiope appensa* (Walckenaer 1841)
The HDF property has a very large number of orb weaver spiders. The line of Norfolk Island pine trees at the makai end of the property are especially well placed to host the spiders as breezes deliver flying insects to their webs. They are easily spotted by the distinctive white X where they rest ready to rush out and wrap up the next item snagged by their web. These spiders pose no threat to people or livestock.²

*Figure 13. Orb weaver in Norfolk Island pine along lower road. The occupant is easily found on the white X at center of web.*

*Tetragnatha mandibulata* Walckenaer, 1841 long jawed spider
This slender spider was seen on webs spun up over the ditches (Figure 5, 6, 7) to snag flying insects emerging from or going to the water. This spider is not a threat to humans or livestock.

² For anyone skeptical of the safety of these spiders: we used them in filming scenes for the TV series LOST where the actor had to have the spider ON them; we use them with children’s wildlife classes.
Invertebrates Noted: continued

**ARTHROPODA**
**INSECTA**
**DIPTERA (flies)**

Two species of flies were common on the manure piles: *Stomoxys calcitrans* (Linnaeus, 1758) and the smaller and slimmer *Sepsis biflexuosa biflexuosa* Stobl, 1893, 4 mm long. Both are widespread throughout the island chain. *Stomoxys* has the common name “stable fly” due to its association with the manure of horses and cattle, but it also breeds in rotting vegetation, including beach seaweeds. The adult stable fly is 6 millimeters (mm) long, with abdominal spots and prefers to land on animals’ legs, causing much annoyance and loss of productivity. The adults feed on the blood of livestock and nearby humans by piercing the skin. Proven control methods include introduction of parasitic micro-wasps and spreading out of manure. (DuPonte and Larish 2003).

The 5 mm horn fly, *Haematobia irritans*, congregates near the horns of cattle on all isles where their biting causes pain and annoyance, interferes with feeding, but it rarely bites man. It has been widespread since 1898 and Kaua’i herds have benefitted from control by imported micro-wasps and beetles that reduce larvae breeding in dung.

The greenbottle fly (*Lucilia sericata* (Meigen, 1826)) was not seen on site, but was reared in small numbers from manure in the lab. It varies in size 5-10 mm in length. This fly feeds by soaking up fluids with a sponge-like mouth and can not bite or sting.
Invertebrates Noted: continued

**LEPIDOPTERA** (butterflies, moths)

Lycaenidae

*Lampides boeticus* (Linnaeus) or bean butterfly

![Image of a butterfly on manure]

**Figure 16.** The bean butterfly was frequently found on the manure and dirt wet with urine.

At all times of day, these small, attractive bean butterflies were numerous throughout the property. They were observed sitting on manure or wet earth, where it appears they take up minerals in the manure. Their caterpillars are hosted by legumes, on site mostly the alien weed, smooth rattlepod (*Crotalaria pallida* Aiton). In home gardens, however, they are a significant pest of peas and string beans.
Invertebrates Noted: continued

**COLEOPTERA** (beetles)

Dung beetles destroy manure by both physically tunneling into it, using it as food for their larvae, and by burying it. Breaking up the manure also makes it more accessible to other controlling species. For example, opening up the piles makes it easier for birds to find the larvae of flies. Burying of manure aids soil fertility. Some species of these beetles are already active in the adjoining property. Dung beetles are a key part of the integrated pest management web.

**Scarabaeidae**

* Aphodius lividus* (Olivier, 1789)  
Considered a very early, accidental introduction with the first cattle to reach the Hawaiian Islands (Funasaki et al 1988); noted on Kaua‘i in 1985 survey (Markin et al. 1998).

* Onthophagus gazella* (Fabricus, 1787)  
Adults and larvae reduce the cattle manure by eating, dispersing, and excavating it. In Hawai‘i since 1957; re-released in 1959 and 1973 (Funasaki et al 1988); Noted on Kaua‘i in 1985 survey as “most abundant.” (Markin et al. 1998)
Invertebrates Noted: continued

**HYMENOPTERA** (wasps, bees, ants)

Three species of ants were noted in the survey (See Table 1). All are widespread in the island chain. They were observed as present on and under manure where they are predators on eggs and larvae of pest flies. They are part of the integrated pest management web.

- Big-headed ants (*Pheidole megacephala*) are especially fierce predators on other insects, including other ants.
- Carpenter ants (*Camponotus variegatus*), despite the name, do not eat wood, rather the species is attracted to sweet things.
- *Ochetellus glaber* (no common name) is attracted to sweet foods and is recorded as a biter. We have personal experience with *O. glaber* swarming on clean, unused soft paper even in boxes. (e.g., facial tissue) (Figure 18).

None of the three species sting, but all can bite. Still, despite our close interaction with *O. glaber*, we have only rarely been bitten in 15 years, and that when we were removing them from the area.

See *What's Bugging Me?* and *Pests of Paradise* for suggestions on control measures. See also Medically important species section (page 25)

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3 In 1995, when *What's Bugging Me?* was published, *O. glaber* was only found on Oʻahu and Maui; by 2002 when the same author edited the *Hawaiian Terrestrial Arthropod Checklist*, the species had spread to Kauaʻi and Hawaiʻi islands as well.
Invertebrates Noted: continued

**ODONATA** (dragonflies, damselflies)
Dragon fly adults and young are predators in the integrated pest management web.

Libellulidae: *Orthemis ferruginea*
This handsome dragonfly has both red and pink coloring. It was seen over and near the water in ditches (Figure 5, 6, 7). The adults and young are general predators and so are part of the overall ‘natural control’ system. Pest flies are among adult dragonfly food items. The young, termed naiads, mature from egg masses laid in fresh water. They control the young of pest species that live in water (such as mosquito larvae).

*Figure 19.* Dragonflies patrol seeking prey

*Figure 20.* Pink phase *Orthemis* dragonfly
INVERTEBRATES NOT PRESENT: Native Hawaiian
No federally or state listed endangered or threatened invertebrate species were noted in this survey (DLNR 1997; USFWS 2014). There is no federally designated Critical Habitat for any invertebrate species on or adjacent to the subject property. No anticipated actions related to the proposed project activity in the surveyed locations are expected to threaten entire species or entire invertebrate populations.

MOLLUSCA
Gastropoda (Snails) Pulmonata
Lymnaeidae: Erinna newcombi Adams & Adams, 1855  
Newcomb’s Snail
This threatened Kaua‘i native fresh water snail was not found during the survey. The location does not provide appropriate habitat for this species. None of the designated critical habitat for the snail is on the property. (USFWS 2000, 2006b)

ARTHROPODA
ARANEAE (Spiders)
Adelocosa anops  
Kaua‘i cave wolf spider
This survey showed no evidence of lava tubes (caves) that would support the endangered Kaua‘i cave wolf spider. An archaeological survey of the area (Dega, et al. 2014) also found no evidence of lava tubes. None of the areas designated as critical habitat for the recovery of this species are in the project area (USFWS 2003a).

INSECTA
Diptera: Drosophilidae Drosophila
No native Drosophila were observed on the property. The location does not provide appropriate habitat for the native Drosophila musaphilia listed as endangered on Kaua‘i. (USFWS 2006a). The only critical habitat designated for this species is at Kōke‘e, Kaua‘i. (USFWS 2008).

Lepidoptera: Sphingidae Manduca blackburni
Blackburn’s sphinx moth, an endangered species, was not present (USFWS 2003b, 2005). Neither the moth’s solanaceous native host plant, ‘Aiea (Nothocestrum sp.), nor the best alien host, tree tobacco (Nicotiana glauca), was observed on the property in this survey or recent botanical surveys (David and Guinther 2014).

Odonata:
No native damselfly species were observed during the survey.

CRUSTACEA
Amphipoda: Spelaeorchestia koloana  
Kaua‘i cave amphipod
No suitable habitat for the Kaua‘i Cave Amphipod is located on the property (USFWS 2003a) [see above Kaua‘i cave wolf spider].
INVERTEBRATES NOT PRESENT: Manure-related
Considerable literature exists on manure-related pest species and their parasites and predators. From these sources, it can be theorized what species of invertebrates might be attracted to fresh manure at HDF sites. Table 2 lists invertebrates species recorded as present on Kaua‘i, some for many decades, but not found on site in this survey. The dog dung fly, resident in areas with high pet populations, is notoriously pestiferous due to persistent landings on human legs. Mostly thriving in yards of dog owners not promptly removing dung, farms may be erroneously blamed for high densities of these annoying flies. A few do breed in cow droppings, but this can be reduced with less corn in feed, as Lee and Toyama (1991) showed a positive ovipositional response of *M. sorbens* to residues of digested ground corn in feces of dairy cows.

**Table 2.** Invertebrates known on Kaua‘i but NOT present at HDF site

<table>
<thead>
<tr>
<th>Species</th>
<th>Common Name</th>
<th>Status</th>
<th>on Kaua‘i</th>
<th>not at HDF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DIPTERA</strong></td>
<td>Flies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fanniidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Fannia canicularis</em> (Linnaeus, 1761)</td>
<td>little house fly</td>
<td>Adv</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td><em>Fannia pusio</em> (Wiedemann, 1830)</td>
<td>chicken dung fly</td>
<td>Adv</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>Muscidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Musca domestica</em> Linnaeus, 1758</td>
<td>house fly</td>
<td>Adv</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td><em>Musca sorbens</em> Wiedemann, 1830</td>
<td>dog dung fly</td>
<td>Adv</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td><strong>COLEOPTERA</strong></td>
<td>Beetles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Histeridae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Pachylister caffer</em> (Erichson, 1834)</td>
<td></td>
<td>Pur</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>Hydrophilidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Sphaeridium scarabaeoides</em> (Linnaeus, 1758)</td>
<td></td>
<td>Pur</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>Scarabaeidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Copris incertus prociduus</em> Say, 1835</td>
<td>black dung beetle</td>
<td>Pur</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td><em>Oniticellus militaris</em> (Castelnau, 1840)</td>
<td></td>
<td>Pur</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td><strong>HYMENOPTERA</strong></td>
<td>parasitoid wasps</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chalcididae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Brachymeria podagrica</em> (Fabricus 1787)</td>
<td></td>
<td>Adv</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>Eulophidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Eucoila impatiens</em> (Say, 1836)</td>
<td></td>
<td>Pur</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>Pteromalidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Spalangia cameroni</em> Perkins, 1910</td>
<td></td>
<td>Pur</td>
<td>✓</td>
<td>X</td>
</tr>
</tbody>
</table>

**STATUS:**
Adv adventive Pur purposefully introduced

See Funasaki et al 1988; Markin et al. 1998; Toyama & Ikeda 1976
Invertebrates Not Present: Manure-Related  continued

**Diptera - flies**

These fly species were NOT noted on site in this survey. As these species occur on Kauaʻi, it is possible they could be attracted to cow manure if it were allowed to accumulate in places like the milking areas. The HDF waste management plan minimizes such accumulations of manure. The presence of dung beetles and birds disrupting the manure is an important control mechanism to reduce fly egg laying in the fields. [See also Recommendations page 28]

*Fannia canicularis* (Linnaeus, 1761)  little house fly  

*Fannia pusio* (Wiedemann, 1830)  chicken dung fly  
Although several parasitic species have been introduced to the Hawaiian chain to attack this pest, most have not established on Kauaʻi. As the common name implies, this fly prefers to breed in large accumulations of chicken dung at night roosting locations. It can breed in cow manure, however, it was not noted at the HDF site during the survey.

*Musca domestica* Linnaeus, 1758  house fly  
Breeds in wide variety of materials, including animal manure of many kinds. Several of the micro wasps introduced to control this fly have not been recorded on Kauaʻi.

*Musca sorbens* Wiedemann, 1830  dog dung fly  
As with *F. pusio* and *M. domestica*, species introduced to control this fly have not established on Kauaʻi. Found most commonly in dog droppings that are left in the open, the fly can use cow manure for egg laying.

**Coleoptera – beetles**

Adults and larvae of several beetle species reduce cattle manure by eating and moving it. This disrupts, degrades, and reduces the volume of manure, making less habitat for flies. At no point in their life cycle do dung beetles feed on any living plants, and they are incapable of biting or stinging humans or animals.

In addition to the two species of dung beetles seen during the survey, the manure-feeding species in Table 2 are known to have been present on Kauaʻi for many years. These species would naturally move to the new manure resources created by the HDF operation. The beetles also could be imported to the site to start the population. [See Recommendations page 28]

*Pachylister caffer* (Erichson, 1834)  
In Hawaiʻi since 1957; Noted on Kauaʻi in 1985 as “very common” (Markin et al. 1998).

*Sphaeridium scarabaeoides* (Linnaeus, 1758)  
In Hawaiʻi since 1909 (Funasaki et al 1988); Noted on Kauaʻi in 1985 survey as “common” (Markin et al. 1998)
Invertebrates Not Present: Manure-Related continued

Coleoptera – beetles continued

*Copris incertus prociduus* Say, 1835
In Hawai‘i since 1922 (Funasaki et al 1988); noted as present on Kaua‘i in 1985 survey, but not a robust population (Markin et al. 1998).

*Oniticellus militaris* (Castelnau, 1840)
In Hawai‘i since 1957 (Funasaki et al 1988); noted as present on Kaua‘i in 1985 survey, but not a robust population (Markin et al. 1998).

**Hymenoptera - ants, bees, wasps**

Several extremely tiny parasitic wasps have been introduced to the Hawaiian Islands as a means of reducing pest fly populations for many decades. The adult wasps lay their eggs in the larvae of flies. These wasps do not sting humans or livestock, their ‘stinger’ is actually an ovipositor – a way to put their eggs into the larvae of a fly. The adult male wasp has no ‘stinger’.

*Eucoila impatiens* (Say, 1836)
In Hawai‘i since 1910 (Funasaki et al 1988); known on all major islands

*Brachymeria podagrica* (Fabricus 1787)
This species is established on O‘ahu and Kaua‘i. It was not purposefully introduced, but most likely came into the islands very early aboard a ship carrying livestock or horses and their manure.

*Spalangia cameroni* Perkins, 1910
Introduced to Hawai‘i 1914-1920 (Funasaki et al 1988); Known on all major islands.

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**Figure 22. Spalangia cameroni attacking** fly pupa to lay her own egg [left (Jones)]. Adult wasp emerging from housefly pupa [right (EntomoBiotics)].

Both images much larger than life size. See Figure 21 for actual size scale.
Potential Impacts of Control Measures on Endangered or Threatened Native Species
Diptera: *Drosophila*

The project location does not provide any habitat for *Drosophila musaphilia*, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened (USFWS 2008). Any control measures taken to curb cattle-associated pest fly species at this site will not affect native *Drosophila* many miles away in high elevation koa forests. In citing the reasons for the decline of the native *Drosophila*, U.S. Fish & Wildlife notes as a threat the yellow-jacket wasp (*Vespula pensylvanica*) a large, aggressive wasp [see following sections Medically important species]. (USFWS 2006a) Yellow-jacket wasps are unrelated to the tiny parasitic wasps used for control of pest flies associated with cattle operations. Venomous yellow-jackets are predators, attacking other insects, and are a danger to humans, pets, and livestock. Parasitic wasps target a few specific species, lay eggs in the larvae of these target flies, and pose no threat to humans, pets, or livestock.

None of the control species (beetles or wasps) for manure-related pests are known to target native Hawaiian species (Funasaki et al. 1988). Additionally, the elevation and habitat at the HDF site are not appropriate for native Hawaiian flies.

No native invertebrates of any species are attracted to manure of large herbivores. As deer, goats, cattle, pigs, and horses were NOT present in pre-human Hawai‘i, native invertebrates did not evolve to use large manure piles as habitat or food.

**Potential Impacts of Control Measures on Beneficial Adventive Species**

All of the parasitic or predator species listed in Table 2 and 3 have been in the Hawaiian Islands for many decades, in some cases for more than half a century. Each species is focused on a particular target species and is not a general predator. For example, as flies and bees are in very different insect lineages, a predator focused on flies would not select bees as a target. Honey bees have not been affected by any fly predators. Recent honey bee declines in the wild on O‘ahu and Hawai‘i islands are due to recent accidental introductions of the Varroa mite that directly targets honey bees, and a souring beetle that ferments nectar in the hive. Neither has been reported on Kaua‘i, and quarantines must be maintained to ensure they do not arrive. Strict compliance with agricultural / equipment inspections and with shipping rules is important.
Medically Important Species

Honey bees (*Apis mellifera*) were seen at the watering trough for the Mahaulepu Cattle Co. stock (Figure 23) and on HDF overhead sprinklers. It is to be expected that honey bees will visit any water source set up for the HDF herd. Bees are an essential part of the overall agricultural ecosystem. A ‘ramp’ should be built into any open water source to allow bees some chance of escape rather than drowning (red circle). A struggling bee, floating in the tank, lapped up by a drinking cow could sting by reflex. It would be appropriate to use a scoop or sieve to remove bees before stock enter the drinking area.

[See Cautions end of this section, page 27]

![Figure 23. Any water source will attract bees, an important part of the agricultural system. An “escape ramp” can reduce drowning.](photo of non-HDF water trough)
Medically important species: continued

**Leaf cutter bees** (megachilids), also on site, may be found in hollow twigs, tubing and similar hollow structures. A member of the public could confuse a leaf cutter bee with a honey bee or large fly, so reports of such should be verified.

![Figure 24. Black female, golden male Carpenter bees; tunnel](image)

**Carpenter bees** (*Xylocopa sonorina*) are on the property. The big, black carpenter bee females and golden males are easily seen. Carpenter bees carve out a short tube shaped tunnel in soft wood (fence post, dry branches) (Figure 24). They do not form colonies, but live solitarily.

Neither leaf cutter nor carpenter bees are a danger to people or livestock if undisturbed.

**Common paper wasps** (*Polistes* sp.) were seen, in several places on the property. There are two species known on Kaua‘i. This wasp may expand their numbers when structures are erected on the property, creating dry, sheltered sites. These wasps are common throughout the island lowlands and especially like to build their ‘paper’ nests under the overhangs of buildings. One was noted in the Norfolk Island pine directly outside the HDF office trailer (Figure 25). They are a danger to humans. They sting repeatedly, unlike honey bees. Nests are best destroyed at night when all wasps are on the paper nest. Destroying the nest during daylight hours will result in rebuilding when the wasps return later in the day.

![Figure 25. Paper wasp nest at office](image)
Medically important species: continued

**Mud dauber wasps** (*Sceliphron caementarium*) were seen on the HDF site. This medium-sized wasp builds a shelter for its young from mud and supplies the nest with food such as small spiders. Occasionally, the wasps will congregate in a sheltered location such as an overhang to rest. They can sting humans, but rarely come in direct contact with people. If encountered, do not interfere with them. The wasps are shy and should not be a risk to the livestock under normal conditions. They are spider predators.

Yellow-jacket wasps (*Vespula pensylvanica* (Saussure, 1857)) (Figure 26 above) were **NOT** seen on HDF property, although the species is present on mauka Kaua‘i. This large, ground nesting, aggressive wasp is a danger to humans, pets, and livestock. HDF staff should be familiar with the appearance of yellow-jacket nest entrances and obtain professional extermination help immediately if one is suspected. Cordon off the area and restrict access until an eradication team with proper protective gear can arrive. Never attempt to deal with this wasp yourself.

The property includes habitat for **centipedes, scorpions, and brown widow spiders**. Although these medically important species were not seen in this quick survey, they are likely to be present in the area. They are general insect predators and will attack a wide variety of species.

**GENERAL CAUTIONS:** Avoid storing boxes or bags directly on the ground or on cement floors, as this provides ‘habitat’ for centipedes and others that can sting when disturbed. Be alert when moving stones or piled brush. Wearing gloves, covered shoes, long sleeves, and long pants will greatly reduce the risk of accidental stings or bites.
Medically important species: Cautions continued

Important to survival of useful insects and vertebrates (e.g., bees, birds) are safe application practices when using any unavoidable herbicide or pesticide. Carefully chosen materials with narrowly targeted applications directed toward the pest species are important. Anyone using herbicides or pesticides should be trained and informed for safety of workers, cattle, and all non-target wildlife. If a honey bee colony location appears to be a danger to workers or cattle, contact a local beekeeper for advice and removal.4

Please see *What Bit Me?* (Nishida and Tenorio 1993) and *Pests of Paradise* (Scott and Thomas 2000) for additional information on human / insect interaction.

**NOTE:** None of the parasitic wasps discussed in this report as potential controls of pest flies are listed as threats to humans in either *Pests of Paradise* or *What Bit Me?*

Employees should be alert for all species named above during work on the property. Some individuals can experience anaphylactic reactions to the venom, not just of honey bees, but to any of the arthropods mentioned in this section. Each of these species may pose a serious risk to some individuals, and supervisors should be aware of any special employee allergy. Any allergic employees should have their antidote nearby at all times and ensure others know where it is and how to assist them.

**RECOMMENDATIONS**

**MONITOR NEAR-BY, NON-DAIRY FLY BREEDING LOCATIONS**

Be vigilant regarding the number of chickens, cats, and dogs in the vicinity of the HDF operation. While these may have their place in a farm operation, each of these species can provide sufficient manure to breed flies, for example, chickens are among the birds disturbing cattle manure and helping to reduce fly habitat. Dogs discourage wild pigs and rats. Cats reduce rats and mice. Proper disposal of dog and cat feces is important. If the chickens increase and congregate, feces may accumulate to an amount sufficient to become a fly breeding location.

Good housekeeping is an important tool in controlling establishment of most flies. Human food waste from on-site workers' meals should be disposed of in a covered, lined container and removed from the site often. Any spilled or waste supplement foods for the cattle should not be allowed to become wet and stay exposed. As it rots, it will provide attractive habitat for fly breeding. Dispose of these materials promptly.

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4 Find a beekeeper via Hawaii Beekeeper’s Association. www.hawaiibeekeepers.org/list.php
Recommendations: continued

An increase in illegal dumping of household trash may prove to be an unintended consequence of the new Kaua’i County Council’s approval of a variable rate / volume trash disposal fee (Moriki 2014). The anonymity provided by locations such as the country roadsides in the near vicinity of HDF may become a convenient place to drop trash. For example, after large parties, bags of trash containing food remains may be dumped, rather than held at home when a family’s smaller trash cart is filled. Household trash sitting in the open is a recognized fly breeding habitat (Ikeda et al. 1973). HDF personnel should be alert for bags along the roads around the property and remove them if practical. If left, the trash bags could breed flies that would then migrate to the nearest habitat of interest – the cattle manure.

ENCOURAGE ECOSYSTEM TRANSFER:
As Mahaulepu Cattle Co. stock are present in the adjacent property, the species associated with manure breakdown also are present. If the HDF cattle began their journey around the HDF paddocks in the sections near areas where the Mahaulepu Cattle Co. herd was recently grazing, the predators and parasites would more readily migrate to the manure being deposited by HDF cattle.

INCREASE DUNG BEETLE DIVERSITY:
Among the effective methods of controlling flies that breed in cattle manure is to speed the manure toward composting. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. Below are outlined short-term and long-term methods of enhancing existing dung beetle numbers to breakdown larger quantities of manure patties.

A. Immediate increase in numbers
In the new pastures, it would be beneficial to quickly boost the breeding population of dung beetles as the cows arrive and begin defecating. This could be accomplished by transplanting adult beetles from older Kaua’i pasture locations. Dung beetles are attracted to light at night, so by visiting locations where beef cattle are established and setting up a typical entomological night collection light with white sheet (Figure 27), it would be possible to collect many adults.

©Figure 27. Typical night collection sheet / light set up.
Recommendations: Increase Dung Beetle Diversity: continued

These could be transported to HDF pastures and placed near fresh manure, which they would quickly colonize and break down as part of their breeding cycle. This would accelerate a dung population increase.

B. Multiple benefits of diverse dung beetle species

Cattle manure contains carbon and valuable soil nutrients, and is a food source for soil microflora, protozoa, and earthworms. For the manure’s value to be realized, it must be incorporated into the soil profile. Dung beetles are nature’s way of recycling these resources back into the soil to be further broken down and encourage plant growth. If manure stays on the soil surface and dries, 80% of the nitrogen is lost into the atmosphere. (Griffith 1997)

Australia provides an example of the efficiency and results provided by dung beetles. Unburied manure from Australia’s imported cattle was a fertile breeding ground for nuisance flies until a comprehensive bio-control project to reduce and recycle bovine manure was initiated by Professor George Bornemissza, Commonwealth Scientific and Industrial Research Organisation (CSIRO). The project replicated the intricately adapted dung processing by beetles known in Africa and Europe. In 1972 the first dung beetles were brought into Australia, and the beetles now break up the pads and bury the rolled away dung balls after laying their eggs in them. This ecologically based work both controlled the fly nuisance and helped to improve soil fertility. Dr. Bornemissza found that 95% fewer horn flies emerged from cow pats attacked by the beetle, *Onthophagus gazella*, than from pats without beetles. (Ürményházi 2010)

In 1998, entomologists George Markin, US Forest Service, and Ernie Yoshioka, Hawai’i Department of Agriculture (HDOA), both now retired, wrote a history and evaluation of a century of manure insect biological control work by HDOA and cooperators. These experts wrote that some of these species could be distributed to new islands to more quickly recycle bovine manure pads and reduce fly larva habitat. Dr. Markin writes:

“In the State of Hawaii, the horn fly control program was one of the longest and most extensive biological control projects for a single insect pest. It resulted in the establishment of a complex of 25 agents, representing 6 families of insects, all using the same ecological resource, cattle dung, in diverse pasture habitats and microclimates. The program appears to have been successful in some parts of the island of Hawai’i, and probably would have also shown similar success on neighboring islands, if vigorous redistribution of the new African beetles had been attempted.” (Markin and Yoshioka 1998)
Recommendations: Increase Dung Beetle: Diversity

In an ideal complex of dung beetles, manure burial would be ongoing 24 hours a day. Though it may take several different dung beetle species to accomplish this goal, the behavioral diversity among species makes it a feasible goal. Some are nighttime flyers, some fly during the day, and some prefer older manure to very fresh. If several species are working together, some may bury the brood ball close to the manure pat, some farther away, some shallow and some deep. (Figure 28) (Thomas 2001)

High populations of dung beetles will bury dung pats in one to three days. This destroys the habitat for other insects and internal parasites to complete their life cycle. Charles Griffith has reported that Texas scholar, Dr. Truman Fincher has studied both the Hawai‘i Parker Ranch dung beetle populations and worked with many Texas cattle herders who changed to holistic management using cell grazing systems and high stock density. Additionally, his work showed less use of veterinary parasiticide chemicals with long lasting residues helped dung beetle populations soar, and kept pastures cleaner. A report by K. Kruger and C. H. Scholtz in a recent publication of the Journal of Agriculture Ecosystems and Environment, on lethal and sublethal effects of ivermectin on dung beetle breeding stated that treated cattle’s manure had suppressed development of the dung beetle *E. intermedius* for 28 weeks after injection. (Griffith 1997)

A long-term, ecological method of combating manure fly breeding would be increasing the diversity of dung beetle species now present on Kaua‘i. The distribution records (Bishop Museum 2014) show only some of the 14 dung beetle species imported between 1898 and 1982 were located on Kaua‘i in a 1985 survey (See Table 3 by Markin and Yoshioka 1998). Bringing some of these additional beneficial species to Kaua‘i might be done in cooperation with the Hawai‘i Department of Agriculture and other cattle owners to the benefit of all cattle operations.
Table 3. Markin and Yoshioka listed enemies of flies not established on Kaua'i (far right) by 1985. A dash indicates their survey did not find that species. (1998, p 47)

<table>
<thead>
<tr>
<th>Species</th>
<th>Year(s) of Introduction</th>
<th>Hawai'i</th>
<th>Abundance Maui</th>
<th>O'ahu</th>
<th>Kaua'i</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scarabaeidae (Dung Beetles)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Aphodius finetarius</em></td>
<td>1909</td>
<td>+++</td>
<td>++</td>
<td>+++</td>
<td>?</td>
</tr>
<tr>
<td><em>A. lirvis</em></td>
<td></td>
<td>Cosmopolitan</td>
<td>+</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td><em>Canthon humectus</em></td>
<td>1923</td>
<td>++</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><em>Copris incertus</em> (incertus)</td>
<td>1922</td>
<td>++</td>
<td>+</td>
<td>+++</td>
<td>+</td>
</tr>
<tr>
<td><em>Eucnemidellus africanus</em></td>
<td>1974</td>
<td>++</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><em>Oniticellus (=Listongia) militaris</em></td>
<td>1957</td>
<td>+++</td>
<td>++</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td><em>Oniticellus cincus</em></td>
<td>1958</td>
<td>-</td>
<td>-</td>
<td>++</td>
<td>-</td>
</tr>
<tr>
<td><em>Onitis alesia</em></td>
<td>1976</td>
<td>++</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><em>O. vanderkelleni</em></td>
<td>1976</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><em>Onthophagus bivoidis</em></td>
<td>1973</td>
<td>++</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><em>O. gazella (=catta)</em></td>
<td>1957, 1973</td>
<td>+</td>
<td>+++</td>
<td>+++</td>
<td>++++</td>
</tr>
<tr>
<td><em>O. incensus</em></td>
<td>1923</td>
<td>+</td>
<td>-</td>
<td>+++</td>
<td>-</td>
</tr>
<tr>
<td><em>O. nigriventris</em></td>
<td>1975</td>
<td>+++</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><em>O. sagittarius</em></td>
<td>1958</td>
<td>+++</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Histeridae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hister (=Pachylister) caffer</em></td>
<td>1957</td>
<td>+</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td><em>H. nomas</em></td>
<td>1957</td>
<td>+</td>
<td>+</td>
<td>++</td>
<td>-</td>
</tr>
<tr>
<td><em>H. bimaculatus</em></td>
<td>1909</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><em>H. coenosus</em></td>
<td>1952</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><em>H. (=Pachylister) lactarius</em></td>
<td>1958</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hydrophilidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Sphaeridium scarabaeoides</em></td>
<td>1909</td>
<td>+++</td>
<td>+++</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Staphylinidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Oxytelus sp.</em></td>
<td>1920</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+++</td>
</tr>
</tbody>
</table>

- = Not recovered; + = One or two specimens recovered; ++ = Common at a few locations; +++ = Very common at most locations; ++++ = Most abundant species in the complex.

4 Previously recorded as established (Table 1), but not recovered in these surveys.
Figure 2: Graphic illustration of the classic breakdown of dung, shows why establishing species already in the state, but not on Kaua‘i is important. Each dung beetle species uses a different strategy in manure breakdown and cleanup. Multiple species lessen competition by using a different area of the manure and moving it to a different place. (from Bertone et al. n.d.)
ACKNOWLEDGMENTS

Jim Garmatz was helpful throughout the survey in providing location guidance and access. Thanks are extended to David Palama of Mahaulepu Cattle Co. for his kokua in allowing us access to adjacent property. Adam Killermann, AJAR Inc., provided information on water resources and pest responses during the period when the land supported sugar cane fields.

Steven Lee Montgomery conducted all collecting and is responsible for all conclusions. Anita Manning assisted in the field survey and contributed to preparation of this report. Some images used in this report were not taken in the course of this project. These photos, marked by © symbol are not released for other uses. They were made by Anita Manning and/or S. L. Montgomery prior to this contract and were chosen because they best illustrate the subject.
STANDARD NOMENCLATURE


Invertebrate names follow

*Common Names of Insects & Related Organisms* (HES 1990)

*Hawaiian Terrestrial Arthropod Checklist* (HBS2002a; Nishida 2002)

Mammal names follow *Mammals in Hawaii* (Tomich 1986).

Place name spelling follows *Place Names of Hawaii* (Pukui et al. 1976).

Plant names follow

*Manual of the Flowering Plants of Hawaii* (Wagner et al. 1999)

*A Tropical Garden Flora* (Staples and Herbst 2005)


ABBREVIATIONS

APHIS U. S. Dept. of Agriculture’s Animal & Plant Health Inspection Service

CSIRO Commonwealth Scientific and Industrial Research Organisation [federal government agency for scientific research in Australia]

DLNR Department of Land and Natural Resources, State of Hawai‘i

DOFAW Division of Forestry and Wildlife, State of Hawai‘i

HDF Hawai‘i Dairy Farms

HDOA Hawai‘i Department of Agriculture

sp. species

spp. more than one species

USFWS United States Fish and Wildlife Service
GLOSSARY

Adventive: organisms introduced to an area but not purposefully.

Alien: occurring in the locality it occupies ONLY with human assistance, accidental or purposeful; not native. Both Polynesian introductions (e.g., coconut) and post-1778 introductions (e.g., guava, goats, and sheep) are aliens.

Arthropod: insects and related invertebrates (e.g., spiders) having an external skeleton and jointed legs.

Endemic: naturally occurring, without human transport, ONLY in the locality occupied. Hawaii has a high percentage of endemic plants and animals, some in very small microenvironments.

Indigenous: naturally occurring without human assistance in locality it occupies; may occur elsewhere, including outside the Hawaiian Islands. (e.g., Naupaka kahakai \((Scaevola sericea)\) is the same plant in Hawai‘i and throughout the Pacific).

Insects: arthropods with six legs, and bodies in 3 sections

Invertebrates: animals without backbones (insects, spiders, snails / slugs, shrimp)

Kalo lo‘i: taro farm

Larva / larval / larvae (plural): immature stage of offspring of many types of animals.

Makai: toward the ocean

Mauka: toward the mountains

Native: organism that originated in area where it lives without human assistance. May be indigenous or endemic.

Natural control: the predator – prey balance in nature that keeps numbers in check. For example, if there’s an increase in flies, spiders, dragonflies, and others have more food, are healthier, and can have more young of their own species. The balance is soon restored. This is as opposed to bio-control which involves humans adding predators to the ecosystem.

Naturalized: an alien organism that, with time, yet without further human assistance, has become established in an area to which it is not native.

Pupa: the stage between larva and adult in insects with complete metamorphosis, a non-feeding and inactive stage often inside a case

Purposefully introduced: an organism brought into an area for a specific purpose, for example, as a biological control agent.

Rare: infrequently found, low numbers.

Species: all individuals and populations of a particular type of organism, maintained by isolating mechanisms that result in their breeding mostly with their kind.

LITERATURE CITED


http://hbs.bishopmuseum.org/checklist/query.asp?grp=

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EntomoBiotics Inc., Round Rock, TX  
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http://uhlibs.lib.hawaii.edu/cgi-bin/Pwebrecon.cgi
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King, B. H. Dept. of Biological Sciences, N. Illinois University, DeKalb, IL http://www.bios.niu.edu/bking/nasonia.htm


LITERATURE CITED: cont.


LITERATURE CITED: cont.


APPENDIX C

HAWAI‘I DAIRY FARMS SOILS BASELINE NUTRIENT STATUS: IMPLICATIONS FOR LONG-TERM SUSTAINABILITY, PRODUCTIVITY, AND SOIL HEALTH

RUSSELL YOST, NICHOLAS KRUEGER
UNIVERSITY OF HAWAI‘I AT MĀNOA
Hawai‘i Dairy Farms Baseline Nutrient Status:  
Implications for Long-Term Sustainability, Productivity, and Soil Health

Russell Yost, Nicholas Krueger  
University of Hawai‘i at Mānoa

May 24, 2016

Prepared for Group 70 International
Introduction

Hawai‘i Dairy Farms, located in Maha‘ulepu Valley, Kaua‘i (Figure 1), implements a new approach, in Hawai‘i, to sustainable dairy operations. The land application of manure nutrients used for crop production, and the subsequent monitoring and managing of key nutrient cycles, specifically those of nitrogen, phosphorus and potassium, as well as hydrologic and carbon cycles, are used to guide dairy management in order to ensure sustainable production while maintaining or improving soil and ecosystem health. The application of effluents generated from dairy operations via irrigation systems has been shown to be an effective means of both managing the effluent while simultaneously returning nutrients needed by the productive tropical grasses (Fulkerson et al., 2016). The value of returning nutrients from dairy effluent has been demonstrated and documented in Hawai‘i conditions by Valencia-Gica (2012). Effluents also contain large quantities of nutrient salts such as sodium (Richards, 1954; Cameron et al., 2003) and potassium that, under specific conditions, require specific management.

Knowledge of the area’s hydrologic conditions, specifically soil drainage characteristics, is essential to utilizing beneficial nutrients from dairy effluent while reducing or eliminating detrimental accumulations of sodium and salts (Silva et. al., 1999). Because one of the objectives of dairy management is to provide ample quantities of nutritious forage for the dairy animals, an assessment of nutrient status and content is needed to ensure maximum productivity of the tropical grasses selected for the dairy. Lastly, an initial characterization of nutrient status constitutes a baseline for future monitoring of nutrient cycles. Macronutrients, nitrogen and phosphorus are major components of pasture grass productivity, ecosystem health and sustainability. The purpose of this study was to review existing information regarding soil nutrient status and to suggest management that would be needed to improve soil health so as to ensure forage grass productivity and sustainability.

Previous Work

Previous survey, characterization and analysis of the Hawai‘i Dairy Farm site was carried out and produced the following reports:
- Spectrum Soils Data Analysis
- Field Trials and estimates of kikuyu forage grass production
- Groundwater Assessment and Hydrologic Analysis of the Hawai‘i Dairy Farm site
- Waste Management Plan, for 699 Mature Dairy Cows
- Estimates of nutrient balance and management for 699 to up to 2,000 mature dairy cows
**Spectrum Soils Data Analysis**

Samples from all proposed paddocks were taken and analyzed. The results from 22 samples of soils from paddocks 101 to 123 (upper central portion of the dairy) are given in Table 1.

Table 1. Average soil pH, soil organic carbon, and key nutrient levels in soils of the proposed site at Hawai‘i Dairy Farms, Maha‘ulepu Valley, Kaua‘i (Spectrum Analysis of 22 samples – North portion of the dairy).

<table>
<thead>
<tr>
<th>Soil Measurement</th>
<th>Mean</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH - water</td>
<td>6.7</td>
<td>5.6 - 8</td>
</tr>
<tr>
<td>Total carbon (estimated from organic matter, %)</td>
<td>3.03</td>
<td>1.92 – 4.42</td>
</tr>
<tr>
<td>Mehlich extractable phosphorus (plant available), mg kg⁻¹</td>
<td>10.4</td>
<td>4 - 42</td>
</tr>
<tr>
<td>Exchangeable potassium, cmol kg⁻¹</td>
<td>0.45</td>
<td>0.13 – 0.97</td>
</tr>
<tr>
<td>Exchangeable calcium, cmol kg⁻¹</td>
<td>13.4</td>
<td>3.29 – 39.76</td>
</tr>
<tr>
<td>Exchangeable magnesium, cmol kg⁻¹</td>
<td>7.25</td>
<td>3.07 – 11.1</td>
</tr>
<tr>
<td>Exchangeable sodium, cmol kg⁻¹</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Soil salinity, dS m⁻¹</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

These results report that soil pH was highly variable, ranging from a low of 5.6 to a high of 8. This indicates a great deal of variability that should be considered in developing management options. Soil organic carbon levels were moderately high, yet highly variable throughout the sampled area. Plant extractable phosphorus was generally low, but varied greatly – from 4 to 42 mg P kg⁻¹. Exchangeable potassium was generally low (0.45) but also varied widely from 0.13 – 0.97. Average exchangeable calcium was moderately high but also varied the most among soil nutrients from 3.29 to 39.76 cmol kg⁻¹. Average exchangeable magnesium was also relatively high at 7.25 and also varied widely from 3.07 – 11.1 cmol kg⁻¹. Soil salinity and sodicity were not initially measured but were assessed with a subsequent sampling and analysis given in this report.

**Low initial levels of soil nutrients**

A summary of the results indicated that levels of soil nutrients were generally low and inadequate to sustain high forage grass productivity. Such low levels of nutrients were only of moderate concern because the application of manures and effluents are known to supply substantial quantities of nutrients that can enrich and regenerate soil fertility (Valencia-Gica et al., 2012). While initial soil carbon values were moderate, it is likely that management for high forage yield through irrigation and organic fertilization with manure will greatly improve soil carbon levels and improve soil health.
**Field Trials and estimates of kikuyu forage grass**

On site estimates of forage grass productivity were conducted to assess actual forage grass productivity of the Maha‘ulepu.


<table>
<thead>
<tr>
<th>Average yield(^1), ton dry matter/Acre/year</th>
<th>Range of yield (minimum March, maximum September)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.3</td>
<td>3.0 – 25.1</td>
</tr>
</tbody>
</table>

\(^1\)Note: It is likely that forage yields would increase considerably with optimal irrigation and application of nutrients. These preliminary results indicate that productivity varies sharply throughout the year requiring some reserve forage.

**Hydrologic analysis of the Hawai‘i Dairy Farm site**

A hydrologic report from TNWRE (2016) reports an analysis of major hydrologic features of the dairy, comprised of surface water and groundwater. This report concludes that potential losses of nitrogen and phosphorus to surface and groundwater, groundwater flow will not be a significant. “…Relative to the surface water, the groundwater flow in the alluvium is very modest. The formation is poorly permeable and even after HDF is in full operation, its contribution to an increase in nutrient load will not be significant in comparison to surface water.”(TNWRE 2016). Thus the potential loss of nitrogen and phosphorus is primarily dependent on the amount of surface water and runoff, which is minimal due to minimal rainfall (98% of the days have less than 0.8 inches). It is estimated there will be 7 to 8 days a year in which rainfall derived runoff will occur (TNWRE 2016). Best management practices outlined in the Waste Management Plan seem more than adequate to reduce and minimize nutrient loss.

**Best management practices identified**

Knowledge of the area’s hydrologic conditions, specifically soil drainage characteristics is essential to utilizing the beneficial nutrients from dairy effluent while reducing or eliminating detrimental accumulations of sodium and salts (Silva et al., 1999). The extensive occurrence of “poorly drained” soils as described further in this report limit leaching of surface water into groundwater as also indicated in the hydrologic report of TNRWE, 2016). Best management practices were identified for controlling surface water in the HDF Waste Management plan (Group70, 2014). The HDF Waste Management Plan (Group70, 2014) calls for a series of BMPs (Best Management Practices) that reduce or eliminate nutrient loading from surface water including set backs, filter strips, buffer plantings and maintaining herbaceous covers. TNRWE, 2016 concludes that the primary challenge will be the operating skills of the HDF personnel, including tracking the actual nutrient balances within the soil, forage, and manure to ensure high forage productivity, avoiding excess fertilizer and anticipating / preparing for weather patterns that might produce runoff. An initial analysis of the nutrient cycling through assessment of the nutrient balances are given below.
**Waste Management Plan, for 699 Mature Dairy Cows**

A comprehensive waste management plan was prepared and presented in the Waste Management Plan (Group 70, 2014). This plan includes assessments and a management plan that includes water resources, flood hazards, soil characterization, dairy management suggestions, irrigation, waste management systems and precautions, as well as monitoring of both soil and water resources.

Implementation of this plan will be essential for ensuring the sustainability of production of forage and the health of the water and soil resources. While quite comprehensive, the report did not include an assessment of the salinity (the addition of nutrient salts) and sodicity (the amount of soil sodium) that might be associated with the high levels of nutrient flux involved as the dairy achieves maximum productivity (Muscolo et al., 2003, El-Swaify, 2000). Other research has shown that effluent in particular contains large amounts of salts (Cameron et al., 2003; Valencia-Gica. 2012). Many of those salts are nutritionally beneficial but some require monitoring such as levels of sodium. The additional sampling, soil characterization, and analysis of the nutrient cycling as represented by the nutrient balance analysis add to nutrient management plan.

**Estimates of nutrient balance and management for 699 to up to 2,000 mature dairy cows: A first approximation of the nutrient balance and estimate of fluxes of nutrients**

An initial estimate of the nutrient balance for the major nutrients nitrogen and phosphorus was reported by Red Barn and Group 70, (2016), Table 3. These calculations provide the basis for estimating nutrient requirements from fertilizers and external sources to ensure grass productivity is sustained at a high level.

Table 3. Estimates of annual nutrient (nitrogen and phosphorus) uptake, manure production, and fertilizer requirements for 470 acres of irrigated dairy pasture (Red Barn and Group 70 report, 2016) revised by including manure contributions from calves.

<table>
<thead>
<tr>
<th>Number of cows:</th>
<th>699</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lbs/acre</td>
<td></td>
</tr>
<tr>
<td>N uptake by pasture</td>
<td>1043</td>
<td>1043</td>
</tr>
<tr>
<td>P uptake by pasture</td>
<td>185.8</td>
<td>185.8</td>
</tr>
<tr>
<td>N from manure</td>
<td>318.1</td>
<td>920.6</td>
</tr>
<tr>
<td>P from manure</td>
<td>66.5</td>
<td>193.6</td>
</tr>
<tr>
<td>Nutrients from Supplemental fertilizer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>724.8</td>
<td>122.4</td>
</tr>
<tr>
<td>P</td>
<td>119.2</td>
<td>-7.9</td>
</tr>
</tbody>
</table>

The nutrients from supplemental fertilizer, shown in Table 3, are not an exact accounting of the total amount of commercial fertilizer to be purchased and applied to the pasture every year. Rather, these values represent the net amount of nutrients required to
maintain high forage productivity and soil health from commercial fertilizer, which is beyond nutrients available from manure sources. Fertilization, especially the additional of nitrogen from a commercial fertilizer can be inefficient with respect to forage production and protein content, and fertilization needs can be as much as 25% to 50% greater than the arithmetical difference resulting from a nitrogen balance calculation. The addition of phosphorus from a commercial fertilizer is also quite inefficient, because of the extensive sorption and binding reactions of phosphorus with the soils at the HDF site, sharply reducing the amount that becomes plant available (Jackman et al. 1997).

Grasses with fibrous root systems are typically among the most efficient plants in using applied (whether through manure or commercial fertilizer) nutrients, especially nitrogen. Previous studies have shown that application of effluents generated from dairy operations via irrigation systems is an effective means of both managing the effluent while simultaneously returning nutrients needed by the productive tropical grasses (Fulkerson et al., 2016), and that the value of returning nutrients from dairy effluent has been demonstrated and documented in Hawai‘i conditions by Valencia-Gica (2012). Therefore, commercial fertilization requirements to maintain high forage productivity and soil health can substantially exceed the arithmetic difference between the nutrients applied by manure and effluent and the forage uptake.

Objectives of the further soil characterization and assessment presented in this report:

Based on the above initial information, several gaps were identified that required further data to characterize and assess soil properties to ensure high productivity and sustainability of the dairy. The assessment of salinity and sodicity potential is important because it can affect forage productivity and soil health. This additional sampling of soils of the Hawai‘i Dairy Farm was carried out with the following purposes:

1. Establish a quantitative baseline of nutrients needed to ensure maximum forage productivity.
2. Establish a quantitative baseline for nutrients that are typically supplied in dairy effluent.
3. Evaluate the extent of the “poorly drained” map units of the proposed dairy
4. Establish a quantitative baseline for the salinity and sodicity status of soils. This baseline will provide a reference point to monitor and ensure sustained productivity and soil health of the dairy land.
Figure 1. Location of Hawaii Dairy Farms site, Kauai'i, Hawaii
Figure 2. Map of the Dairy showing proposed fields, field management units, and proposed facilities. Note the numbered parcels that comprise fenced grazing units, and “Blocks” that represent proposed management units for 699 mature dairy cows (Waste Management Plan, 2014, prepared by Group70, Honolulu, Hawai’i.)

Sampling, Measuring and Analytical Methods

1. Establishing a quantitative baseline of nutrients needed to ensure maximum forage productivity.

Sampling locations were selected on a gridded map, then entered as points into a geographical information system (ArcGIS) and also uploaded to a handheld global positioning system (GPS) for field location (Fig. 3). Once a sampling site was located with the handheld GPS unit, three subsamples approximately one meter apart were taken for each depth, mixed to prepare a composite sample per depth, then prepared and transported for processing. Processing included drying, crushing, and passing the soil
samples through a 2 mm sieve. Processed samples were then delivered to CTAHR’s Agricultural Diagnostic Service Center for the analysis.

Soil Analysis
Soils were analyzed for pH, extractable phosphorus, exchangeable potassium, calcium, magnesium, electrical conductivity (EC), and sodium. Finally soil organic carbon and total soil nitrogen were determined. Total nitrogen and total carbon values were analyzed via dry combustion (LECO, 2002) and expressed in weight percent. Phosphorus was analyzed using Olsen’s extractable P method (Watanabe and Olsen, 1965), and reported in mg kg\(^{-1}\) (equivalent to parts per million or ppm). Cations (potassium, calcium, magnesium and sodium) are reported as centimoles of charge per kilogram (cmol kg\(^{-1}\)) in order to account for the amount of charge of the various cations and to permit the calculation of the relative concentration of sodium. Sodium percent of cations (ESP) was calculated as cmol kg\(^{-1}\) sodium divided by the cmol kg\(^{-1}\) of all cations (potassium, calcium, magnesium and sodium) x 100% in order to compare with literature values in order to evaluate for excessive sodicity. This standard measurement of soil sodicity helps assess the likelihood of soil dispersion, and to compare with recommended values from the NRCS (2012) and other scientific references (McIntyre, 1979; Cameroon et al. 2003). This assessment provides a measure to ensure sustainable productivity and health of the soil resources of the dairy.

Statistical Analysis
The assessment of nutrient adequacy was the statistical comparison and calculations among the soil mapunits. These were carried out using the JMP statistical software (JMP®, 2007). Standard least squares methods were used to test for differences between soil depth and soil mapunit for the nutrient and element contents. Differences were considered significantly different at a probability level of 0.05, although a probability of 0.10 or less was also considered important and worthy of further consideration. Samples from the Ws soil mapunit were not included in the ANOVA since it was only a small portion of the southern portion of the dairy and is basically atypical of the dairy.

Mapping
A geostatistical analysis of the data was also conducted with ArcGIS Geostatistical Analyst Extension using Empirical Bayesian Kriging to map the variability of the fertility characteristics and to interpolate levels of soil measurements to display patterns and trends for the entire dairy. This analysis produces a smooth map of nutrient variation throughout the dairy as illustrated in Figures 3, 4, 5, and 6 illustrating trends and patterns in the soil properties. The analysis also produces a map of prediction error indicating where predictions were less accurate (Figure 7). The map of prediction error helps to identify areas on the dairy which would most benefit from further sampling (Map 10, Sampling Variability). This map of prediction error was almost identical for all response variables, therefore only one (from pH data) is included in this report.
Figure 3. Soil sampling design (43 locations), soil mapunits and initial soil pH map. Note: LuB: Lualualei soil series, well-drained, 2 – 6 % slope; Ws: Waikomo, well-drained, stony clay, PdC: Pakala clay loam, well-drained, 2 – 10% slope; PdA: Pakala clay loam, well-drained, 0 – 2 % slope; Ke: Kalihi clay, poorly-drained; KavB: Ka`ena clay brown variant, poorly-drained, 1 – 6 % slope; KavC: Ka`ena clay brown variant, poorly drained, 6-12% slope; HsD: Hanamaulu silty clay, well-drained, 15-25% slope.
2. Establishing a quantitative baseline for nutrients that are typically supplied in dairy effluent.

The nutrients typically supplied in dairy manure and effluent include nitrogen, potassium and phosphorus, which were measured for input into nutrient balance calculations. A quantitative baseline for these nutrients will enable the monitoring of the balance of nutrient removals by grazing animals and the return and recycling of nutrients through re-use of manures and effluents. Deficits in the recycling of nutrients will be made up by judicious application of nutrients through organic amendments and fertilizers.

The pasture – soil nitrogen status is especially difficult to quantify because nitrogen exists in soil, solution, and gaseous phases. In addition the soil and solution forms are microbiologically mediated between inorganic and organic forms. As a result nutrient nitrogen additions may differ from the simple arithmetic difference between forage and animal outputs and organic and fertilizer inputs. Nonetheless, determining a quantitative baseline of nutrient status is the currently best approach to nutrient monitoring.

The cations (potassium, calcium, magnesium and sodium) are reported as centimoles of charge per kilogram (cmol kg\(^{-1}\)) in order to account for the amount of charge of the various cations and to permit the calculation of nutrient balance and the relative concentration of sodium needed to estimate hazards from sodicity.

3. Determining the extent of “poorly drained” soil mapunits

Two soil samples were taken from each of the 43 locations at the Dairy site, at depths of 0-20cm and 20-40cm, for a total of 86 samples (Figure 2). Thirty-three locations chosen for sampling were from Kalihi Clay (soil mapunit Ke) which is characterized as “poorly drained” and comprises the primary soil mapunit of the south-central area of the dairy. Two samples were taken from the Kaʻena Clay Brown Variant (soil mapunit KavB, KavC), which is also “poorly drained”. Four additional locations were sampled from Lualualei clay (soil mapunit LuB), and two additional locations from Pakala Clay Loam (soil mapunit PdC) and Waikomo Stony Silty Clay (soil mapunit Ws), all of which were classified as “well-drained”, were collected in an effort to gain a broader sense of the site-wide fertility status and to enable a statistical comparison among the various mapunits that comprise the proposed dairy area. In summary the soil mapunits Ke, KavB, and KavC comprised the portion of the dairy that was characterized as “poorly drained.” The management of nutrients and irrigation on this portion of the dairy will differ from that of the “well drained” portion of the dairy (all of the other soil mapunits).

4. Establish a quantitative baseline for the salinity and sodicity status of soils.

Assessing soil salinity and sodicity requires measures of soil cations

The soil salinity is measured as electrical conductivity (EC), which is a quantitative estimate of the amount of salt in the soil. The units are deciSiemens per meter, which is
similar to the historical unit of mmhos/cm (El-Swaify, 2000). A level of soil salinity of 2 to 4 dS m\(^{-1}\) represents an amount of salts in the soil that can cause reduction in growth of some salt-sensitive plants (Hanson et al., 1999). Kikuyu grass, however, seems relatively salinity tolerant (Muscolo et al., 2003).

_Sodicity_, or the relative amount of soil sodium, is expressed as the exchangeable sodium percentage (ESP), which is the concentration of sodium relative to the other cations (calcium, magnesium and potassium). Values of soil sodicity that exceed 15% are recognized as levels that could lead to problems of soil dispersion and altered soil physical properties (Richards 1954; McIntyre 1979; El-Swaify, 2000). This standard measurement of soil sodicity helps to assess the likelihood of soil dispersion, and to compare with recommended values from the NRCS (2012) and other scientific references. These two important measures of soil health provide a quantitative measure useful to monitor and ensure sustainable productivity and health of the soil resources of the dairy.

**Results**

1. **Establishing a quantitative baseline of nutrients needed to ensure maximum forage productivity.**

As indicated in the introduction, the goal and objective of the Hawai‘i Dairy Farm is to improve both the food security of the county of Kaua‘i and state by producing nutritious food while also ensuring and improving soil health. The scientific management of the nutrient cycles is a way to achieve these two goals. The nutrient management of nitrogen, phosphorus, and potassium recommended in this report is designed to achieve both goals. The overall nutrient management strategy proposed in this report is comprised of two steps: 1) Adjust the levels of the critical nutrients in the dairy soils to meet the needs of the fully productive forage grass while avoiding excessive applications that might enter surface and groundwater, and 2) When the pasture and dairy are fully established and achieving full productivity, ensure the sustainability of achieving high productivity while maintaining or improving soil health. A quantitative baseline for these nutrients will enable the monitoring the balance of nutrient removals by grazing animals and the return and recycling of nutrients through re-use of manures and effluents. Deficits in the recycling of nutrients will be made up by judicious application of nutrients through organic amendments and fertilizers.

*Adjustment of nutrient levels on specific soil mapunits*

The first step in ensuring productivity of the forage is to ensure sufficient nutrients are provided to the forage grass. To achieve this, the dairy soils were sampled and analyzed to complement and extend the earlier soil analysis (see Table 1 for preliminary results and Table 4 for the data analysis conducted for this report). These analytical results were obtained by Spectrum Analysis (Table 1) and from the Agricultural Diagnostic and Service Center of the University of Hawai‘i (Table 4).
Table 4. Overall means for soil pH, soil nutrients phosphorus, potassium, calcium, magnesium and sodium. Values for soil salinity, and soil carbon and nitrogen are also given for Hawai‘i Dairy Farms, Maha‘ulepu Valley, Kauai. Analysis by the Agricultural Diagnostic and Service Center, University of Hawai‘i.

<table>
<thead>
<tr>
<th>Soil Measurement</th>
<th>Mean</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH - water</td>
<td>6.8</td>
<td>4.7 – 8</td>
</tr>
<tr>
<td>Extractable phosphorus, mg kg⁻¹</td>
<td>17.2</td>
<td>7.1 – 49</td>
</tr>
<tr>
<td>Exchangeable potassium, cmol kg⁻¹</td>
<td>0.58</td>
<td>0.1 – 6.7</td>
</tr>
<tr>
<td>Exchangeable calcium, cmol kg⁻¹</td>
<td>21.3</td>
<td>5.2 – 46.5</td>
</tr>
<tr>
<td>Exchangeable magnesium, cmol kg⁻¹</td>
<td>11.1</td>
<td>4.8 – 19.7</td>
</tr>
<tr>
<td>Exchangeable sodium, cmol kg⁻¹</td>
<td>1.13</td>
<td>0.24 – 4.44</td>
</tr>
<tr>
<td>Soil salinity (electrical conductivity), dS m⁻¹</td>
<td>0.44</td>
<td>0.04 – 1.73</td>
</tr>
<tr>
<td>Total Carbon, %</td>
<td>2.49</td>
<td>0.68 – 6.2</td>
</tr>
<tr>
<td>Total Nitrogen, %</td>
<td>0.17</td>
<td>0.002 – 0.51</td>
</tr>
</tbody>
</table>

The soil mapunits varied widely for the values of soil pH, potassium, calcium, magnesium, salinity (EC), and sodium (Table 4). These baseline results indicate major differences among the soils of the dairy. These results indicate that in order to achieve maximum forage grass production additional nutrients are needed and they need to be gauged according to soil mapunit. In addition, the large differences among the mapunits, especially in calcium, magnesium, and sodium show that the poorly drained soils will likely need to be monitored separately from those that are not poorly drained. This suggests that regular monitoring of the soil status of paddocks on these soil mapunits are needed as part of the overall monitoring program.

Table 5. Mean soil nutrient contents of phosphorus, potassium, calcium, and magnesium variation with soil mapunit in relation to recommended levels.

<table>
<thead>
<tr>
<th>Soil mapunit</th>
<th>Phosphorus mg kg⁻¹</th>
<th>Potassium cmol kg⁻¹</th>
<th>Calcium cmol kg⁻¹</th>
<th>Magnesium cmol kg⁻¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>KavB</td>
<td>16.0 a†</td>
<td>0.31 b†</td>
<td>7.5 b†</td>
<td>10.1 bc†</td>
</tr>
<tr>
<td>Ke</td>
<td>16.3 a</td>
<td>0.34 b</td>
<td>25.3 a</td>
<td>11.3 b</td>
</tr>
<tr>
<td>LuB</td>
<td>19.0 a</td>
<td>0.50 b</td>
<td>9.1 b</td>
<td>13.9 a</td>
</tr>
<tr>
<td>PdC</td>
<td>15.8 a</td>
<td>1.21 a</td>
<td>8.7 b</td>
<td>7.4 c</td>
</tr>
</tbody>
</table>

†Values followed by the same letter indicate that the values were essentially the same. Otherwise values are ranked by decreasing alphabetical order. Target values are for the following nutrients: phosphorus: 25-35 (mg/kg or ppm), potassium: 0.5-0.76 (200-300 mg/kg or ppm), calcium: 3.75-5.0 (1500-2000 mg/kg or ppm), and magnesium: 2.5-3.5 (300-400 mg/kg or ppm) (Yost and Uchida, 2000).

Soil nutrient levels

Soil phosphorus levels of the dairy were largely inadequate for maximum grass forage productivity (Table 4&5). Portions of the dairy (Figure 4) that are yellow, orange, and red (not green) indicate the regions that were characterized by low levels of the nutrient phosphorus. Soil phosphorus, however, was higher and marginally adequate in the green regions of the dairy. The sharp boundaries of the phosphorus map probably reflect the fact that phosphorus as a nutrient in the soil moves very little and creates localized zones
with high levels next to zones with low levels. The soil potassium map shows much smoother boundaries than does the phosphorus map probably reflecting the much greater mobility of potassium in soils. The soil nutrient potassium was higher on the PdC mapunit of the southwest corner of the dairy site. The higher levels of potassium and phosphorus may have been on fields previously fertilized for other crops. Soil calcium levels were extremely variable representing the sharply contrasting soil mapunits found on the dairy. Levels ranged from marginally adequate in the north portion of the dairy to high and very high in the central southern portion of the dairy. These contrasting levels of calcium may reflect the differences in drainage and nutrient dynamics on the differing mapunits. Calcium levels were adequate but were clearly greater on the Ke mapunit. Soil magnesium levels were similar on all mapunits except the PdC mapunit, which may have included soil of an adjacent field that was previously fertilized and managed differently. The substantially higher levels of soil calcium, magnesium, and sodium on the Kalihi mapunit than on other mapunits probably reflects the results of the lower amounts of water movement through the soil profile and a difference in soil mineralogy – a result of the “poorly drained” water status of the soils. This indication of differing nutrient dynamics may imply monitoring with possible adjustment to the nutrient additions to compensate for nutrient deficits predicted to result from nutrient recycling described below.

Figure 4. Status of soil phosphorus and potassium, Hawai`i Dairy Farms, Maha`ulepu site, Kaua`i.
Initial and maintenance nutrient requirements

As indicated from the initial sampling, soils at the site differ according to the mapunit. A two-step recommendation is proposed. The first step, “restorative nutrient management” is the application of nutrients in the first year to bring the initially low soil nutrient levels to a level to ensure maximum grass establishment and productivity. The second step, “maintenance nutrient management” which is difficult to predict beforehand, is the amount of nutrients to be added for each grazing rotation for each paddock management unit after pasture establishment and grazing frequency and intensity are determined. Applications to paddocks on specific soil mapunits for step 1 were calculated and are given in Table 6. While levels of phosphorus are low on all mapunits, levels of potassium vary and will require adjustment according to mapunit and specific productivity of paddocks on that mapunit. With the initial adjustment of nutrient levels and the close monitoring of nutrients and soil calcium, magnesium, and sodium status on the poorly drained mapunits high productivity and improved soil health is expected.

Table 6. Initial annual levels of nutrient fertilizers that need to be applied to each of the mapunits to achieve potential grass productivity.

<table>
<thead>
<tr>
<th>Soil mapunit</th>
<th>Phosphorus Lbs/A P₂O₅</th>
<th>Potassium Lbs/A K₂O</th>
<th>Soil pH†</th>
<th>Lime requirement lbs/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>KavB</td>
<td>490</td>
<td>180</td>
<td>5.9 b</td>
<td>0</td>
</tr>
<tr>
<td>Ke</td>
<td>490</td>
<td>180</td>
<td>7.1 a</td>
<td>0</td>
</tr>
<tr>
<td>LuB</td>
<td>490</td>
<td>105</td>
<td>5.7 b</td>
<td>0</td>
</tr>
<tr>
<td>PdC</td>
<td>490</td>
<td>0</td>
<td>5.9 b</td>
<td>0</td>
</tr>
</tbody>
</table>
†Values followed by the same letter indicate that the values were essentially the same. Otherwise values are ranked by largest (letter a) to smallest.

The second step in managing nutrient cycles is the careful monitoring of the actual nutrient balances once the dairy is in operation – the “maintenance nutrient management”. The discussion of these recommendations follows in a separate section that describes the monitoring and assessment of the respective nutrient cycles and balances of nitrogen, phosphorus, and potassium. This requirement also depends on the actual animal grazing pressure.

2. Monitoring and balancing nutrients recycled in manure and effluent

In managing nutrient cycles of the dairy the recycling of animal manures constitutes an important input of nutrients to the pasture, particularly in the forms of nitrogen, phosphorus and potassium, all of which are initially present at inadequate levels in the dairy soil. These recycled nutrients substantially reduce the need for fertilizers to maintain forage grass productivity (Fulkerson et al, 2016). The following nutrient balance estimates illustrate the estimated nutrient additions resulting from the recycling.

Table 7. Estimated nutrient balance for each month of the year resulting from forage consumption and manure return (assuming 699 animals). Adapted from a nutrient balance analysis by Red Barn and Group70, 2016.

<table>
<thead>
<tr>
<th>Month</th>
<th>Nutrient removed by the forage</th>
<th>Added by manure, effluent, and slurry</th>
<th>Deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>P</td>
<td>K</td>
</tr>
<tr>
<td>Jan</td>
<td>88.6</td>
<td>15.8</td>
<td>80.3</td>
</tr>
<tr>
<td>Feb</td>
<td>80.0</td>
<td>14.3</td>
<td>72.5</td>
</tr>
<tr>
<td>Mar</td>
<td>88.6</td>
<td>15.8</td>
<td>80.3</td>
</tr>
<tr>
<td>Apr</td>
<td>85.7</td>
<td>15.3</td>
<td>77.7</td>
</tr>
<tr>
<td>May</td>
<td>88.6</td>
<td>15.8</td>
<td>80.3</td>
</tr>
<tr>
<td>Jun</td>
<td>85.7</td>
<td>15.3</td>
<td>77.7</td>
</tr>
<tr>
<td>Jul</td>
<td>88.6</td>
<td>15.8</td>
<td>80.3</td>
</tr>
<tr>
<td>Aug</td>
<td>88.6</td>
<td>15.8</td>
<td>80.3</td>
</tr>
<tr>
<td>Sep</td>
<td>85.7</td>
<td>15.3</td>
<td>77.7</td>
</tr>
<tr>
<td>Oct</td>
<td>88.6</td>
<td>15.8</td>
<td>80.3</td>
</tr>
<tr>
<td>Nov</td>
<td>85.7</td>
<td>15.3</td>
<td>77.7</td>
</tr>
<tr>
<td>Dec</td>
<td>88.6</td>
<td>15.8</td>
<td>80.3</td>
</tr>
<tr>
<td>Annual</td>
<td>1043.</td>
<td>185.8</td>
<td>945.</td>
</tr>
</tbody>
</table>

Nutrient removals in forage and additions in manures
The results presented in Table 7 indicate that the projected removal of nutrients by the highly productive forage grass is not quite balanced by the addition of nutrients in the manures and effluents. This deficit will need to be made up with the addition of nutrients.
from other sources such fertilizers. The amounts that are predicted to be necessary are actually quite small since the dairy will be following a rotational grazing system and animals will be grazing intensively on a paddock for a short period of time. The end of a grazing cycle would be an ideal time for the application of the small amounts of nutrients to restore the nutrient balance.

**Nutrient balance deficit**

Table 7 provides an initial estimate of the nutrient balance deficit. Note that there is a predicted deficit in each of the macronutrients N, P, and K even with the return of manures and effluents. There are two variables that fundamentally determine the nutrient balance estimates of Table 7. The first is the actual forage yield. The estimates in Table 7 for dry matter production are a major determinant of the amount of nutrient removed. The predicted yields for the spring part of the year may well be somewhat less than assumed in Table 7 based on the preliminary yield experiments described in Table 2. The second key variable in determining the actual nutrient balance is the number of animals in the dairy. The number of animals assumed in Table 7 is 699. A nutrient balance calculated with a higher number of animals such as 2000 (data not shown) results in a small excess of phosphorus due to much larger amounts of recycled nutrients.

**Nutrient phosphorus should be monitored carefully**

Soil phosphorus levels were significantly higher in the 0-20cm depth than the 20-40cm depth (Table 8), a not so unusual occurrence where animal manures, as-excreted, are applied. There were no significant differences among soil mapunits. There were some trends in the distribution of phosphorus over the site as illustrated in Figure 4. Nutrient phosphorus is a noteworthy management variable because it typically accumulates or is static because removal rates seldom dramatically exceed application rates. This result also occurs because as indicated earlier, soils especially of the mapunits of the dairy are known to adsorb and retain large amounts of the nutrient phosphorus.

**Table 8. Mean extractable soil phosphorus levels by depth.**

<table>
<thead>
<tr>
<th>Depth (cm)</th>
<th>Mean phosphorus — mg kg⁻¹ —</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-20</td>
<td>19.7 a†</td>
</tr>
<tr>
<td>20-40</td>
<td>13.9 b</td>
</tr>
</tbody>
</table>

†Treatment means within a column not followed by the same letter are different (P ≤ 0.05).

**3. Location and extent of “poorly drained” soil mapunits**

“Poorly drained” soil mapunits tend to reduce leaching of nutrients to groundwater. The previous mapping of the dairy site soils by the Natural Resources Conservation Service (Foote et al., 1972) provides useful information about the status and characterization of the soils of the Hawai‘i Dairy Farms site. The majority of the soils of
the proposed dairy site were classified as “poorly drained” (Figure 3). A further more detailed map of the paddocks that were on the “poorly drained” versus the “well-drained soil is given in Figure 6. A specific listing of the paddocks that are located on “poorly drained” and “well-drained” soil are also given in Appendix 1. It is important to note that the classification of soils as “poorly drained” indicates that on such soils there is less lateral and downward movement of soil water than in soils classified as “well drained”. The designation of “poorly drained” is not an indication of low or poor infiltration, which refers to the ability of water and effluents to enter the soil surface. Said another way, soil “drainage” refers to the movement of water within or through the soil profile.

Additionally, “poorly drained” soils often exhibit anaerobic conditions, which are important in both the presence and movement of nutrients that can affect soil environmental health, most importantly nitrogen and its various soluble forms nitrate, nitrite, and ammonium. Anaerobic conditions typically result in higher rates of nitrogen loss due to denitrification, which is the conversion of potentially environmentally hazardous nitrate and nitrite to gaseous, innocuous forms, reducing or eliminating levels in soils of both the nitrate and very toxic nitrite.

Higher levels of nutrients in “poorly drained” soil mapunits. As a result of the reduced movement of water through the soil profile of “poorly drained” soils, the mobility of other nutrients such as potassium and phosphorus is usually reduced as well. In this way “poorly drained” soils tend to retain more nutrients within the soil profile than do “well-drained” soils. This may well be one of the reasons for the higher soil pH and higher levels of calcium and magnesium noted in the Ke mapunit (Tables 5 and 6). The reduced loss of other nutrients has important impacts on the nutrient balances that need to be calculated and monitored to ensure soil health and quality are sustained. “Well-drained” soils, while allowing movement of water out of the soil profile, still fully support the naturally-occurring, cleansing processes that filter and process water moving through the profile. Other considerations such as depth to the water table and hydrologic conditions are important.
Figure 6. List of HDF paddocks and the soil drainage characteristic of each.

Reduced likelihood of deep leaching of nutrients from surface to groundwater

The hydrology of the proposed dairy site has been thoroughly characterized and documented in the report by Nance (2016). This report indicates that the amounts of soil water that can move from the soil surface into underlying groundwater is minimal when the dairy land is irrigated and manure effluents are applied. While the underlying hydrological conditions tend to separate the surface and underlying aquifers there are important differences reported in the hydrologic study that are discussed above in the section on “poorly drained” soil mapunits. The implications of whether forage is produced on soil mapunits that are “poorly drained” or “well-drained” may affect nutrient and fertilization requirements as well as determination of the nutrient balance of the
various paddocks and nutrient management blocks (Figure 2), thus justifying careful monitoring of the nutrient balance once the dairy is in operation.

4. **Establish a quantitative baseline for the salinity and sodicity status**

The pH of the dairy site soils ranged from the high for the Ke mapunit of to 8 to a low of 4.7 in the KavB and PdC soil mapunits (Table 5, Figure 3). The higher soil pH of mapunit Ke probably was a result of the higher levels of soil sodium recorded in that mapunit. Soil salinity was uniformly low and did not differ much among the soil mapunits (Table 4, Table 9, Figure 7).

Table 9. Levels of soil pH, soil salinity (EC), and soil sodium for major mapunits.

<table>
<thead>
<tr>
<th>Soil mapunit</th>
<th>Soil pH†</th>
<th>Soil salinity (EC), dS m⁻¹</th>
<th>Sodium, cmol kg⁻¹</th>
<th>ESP, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>KavB</td>
<td>5.9 b</td>
<td>0.27 a</td>
<td>0.78 ab</td>
<td>4.2</td>
</tr>
<tr>
<td>Ke</td>
<td>7.1 a</td>
<td>0.48 a</td>
<td>1.31 a</td>
<td>3.4</td>
</tr>
<tr>
<td>LuB</td>
<td>5.7 b</td>
<td>0.25 a</td>
<td>0.67 b</td>
<td>2.8</td>
</tr>
<tr>
<td>PdC</td>
<td>5.9 b</td>
<td>0.19 a</td>
<td>0.38 b</td>
<td>2.1</td>
</tr>
</tbody>
</table>

†Values followed by the same letter indicate that the values were essentially the same. Otherwise values are ranked by largest (letter a) to smallest. Soil salinity in the range of 2 to 4 dS m⁻¹ are considered high enough to affect salt-sensitive plants. Exchangeable sodium levels are well below the threshold of 15% sometimes considered indicative of potential soil physical problems (Richards, 1954; El-Swaify, 2000, Cameroon et al, 2003).

Soil sodium levels were much, much higher in Ke than in the LuB and PdC soil mapunits, while levels of sodium in the KavB mapunit were intermediate (Table 9, Figure 8). The key measurement of soil sodicity, the ESP value, remained well below the level of 15%, frequently considered as the threshold between low, acceptable levels and high, unacceptable levels. It is interesting to note that while the Ke mapunit contained almost double the amount of sodium than did the KavB mapunit, the calculated ESP was similar on both soils pointing out the importance of considering all cations in evaluating sodicity.
Figure 7. Status of soil pH and salinity (EC), Hawai‘i Dairy Farms, Maha‘ulepu, Hawai‘i.

Figure 8 Status of soil sodium and exchangeable sodium percentage (ESP), Hawai‘i Dairy Farms, Maha‘ulepu, Hawai‘i.
Conclusions and Recommendations

1. **Establishing a quantitative baseline of nutrients needed to ensure maximum forage productivity.**
   The results of the initial soil sampling together with the analysis presented in this report indicate that current nutrient levels are generally inadequate for phosphorus and potassium in the soils of the proposed dairy site.

   The results suggest two steps to restore and ensure adequate levels of nutrients so that the forage grass becomes well-established and achieves and maintains maximum productivity.

   Step 1. “Restorative nutrient management”, which is dependent on the initial, baseline quantitative measurement of soil conditions

   Step 2. “Monitoring and adaptive nutrient management”, which is dependent on number of grazing animals, grass productivity, and amount of recycled nutrients and which may vary with soil mapunit.

2. **Establishing a quantitative baseline for nutrients that are typically supplied in dairy effluent.**
   An initial estimate of the nutrient cycles of nitrogen, phosphorus, and potassium indicate that even if all of the manures and effluents are returned to the pasture there will still be a small nutrient deficit that depends on the numbers of animals managed. At the maximum proposed animal population there might be a slight excess of nutrient phosphorus. Alternative best management practices are available to reduce the amount of phosphorus recycled to the dairy paddocks.

3. **Location and extent of “poorly drained” soil mapunits**
   The occurrence of several “poorly drained” soil mapunits, on one hand, confirms the hydrologic study results that concluded little of the surface water would reach the groundwater. In addition, the “poorly drained” property of many of the soils suggests that nitrogen risk may be reduced due to the expected conversion of unhealthy forms of nitrogen such as nitrate and nitrate, and ammonium to gaseous nitrogen through denitrification.
Nonetheless, the impact of the “poorly drained” property on the soil salinity and sodicity should be monitored because those properties vary according to the soil mapunit and will be sensitive to actual nutrient cycles.

4. **Establish a quantitative baseline for the salinity and sodicity of the dairy soils.**

Initial results of measures of soil salinity and sodicity suggest no threat to soil health at present levels. Due to the differing dynamics of “poorly drained” soils, paddocks of the “poorly drained” mapunits Ke, KavB, and KavC should be monitored carefully.

A general recommendation is that ensuring forage grass productivity and sustainability of the dairy will require at least two steps: 1) Restorative nutrient management to ensure grass establishment and productivity, and 2) Maintenance nutrient management, designed to monitor the actual nutrient balance needs. Factors that are likely to cause major impact on the maintenance nutrient requirements are 1) The actual productivity of forage grass, and 2) The number of animals consuming forage and 3) The efficiency in returning manures and effluents to the growing grass. The amounts of rainfall are also important in determining the actual nutrient cycles.

Monitoring the nutrient cycles is thus a primary management variable for sustainable production and for the improvement and sustaining of health of the dairy site soils.
References


Appendix 1. List of HDF paddocks and their most probable drainage class.

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APPENDIX D

NUTRIENT BALANCE ANALYSIS FOR HAWAIʻI DAIRY FARMS

GROUP 70 INTERNATIONAL AND RED BARN CONSULTING
NUTRIENT BALANCE ANALYSIS

for

HAWAI‘I DAIRY FARMS
MĀHĀ ‘ULEPŪ, KAUA‘I, HAWAI‘I

TMK: (4) 2-9-003: 001 por and 006 por
(4) 2-9-001: 001 por

Prepared for:
Hawai‘i Dairy Farms, LLC
P.O. Box 1690
Kōloa, Hawai‘i 96756-1690

Prepared by:
GROUP 70 INTERNATIONAL
925 Bethel Street, 5th Floor
Honolulu, Hawai‘i 96813
(808) 523-5866

And

redXbarn
3050 Yellow Goose Rd
Lancaster, Pennsylvania 17601
(717) 393-2176

May 24, 2016
# Table of Contents

1.0 Project Overview .......................................................................................................................... 1

2.0 Existing Conditions .......................................................................................................................... 5

2.1 Topography ....................................................................................................................................... 5

2.2 Water Resources ............................................................................................................................... 7

2.2.1 Receiving Water Body State Water Quality .............................................................................. 7

2.2.2 Wetlands ....................................................................................................................................... 7

2.2.3 Water Wells ................................................................................................................................. 7

2.3 Rainfall Data ..................................................................................................................................... 10

2.3.1 Normal Precipitation .................................................................................................................. 10

2.3.2 NOAA 24-Hour Rainfall ............................................................................................................. 10

2.3.3 NOAA Rain Gauge Data ............................................................................................................ 11

2.4 Evaporation Data ............................................................................................................................. 12

2.5 Flood Hazards .................................................................................................................................. 13

2.6 Soils ................................................................................................................................................... 13

3.0 Land Use Summary ......................................................................................................................... 16

4.0 Farm Description .............................................................................................................................. 19

4.1 Physical Setbacks for Water Resources ......................................................................................... 21

4.2 Cows Walkways and Races ............................................................................................................ 23

4.3 Dairy Facility .................................................................................................................................... 23

4.3.1 Calf Sheds ................................................................................................................................. 23

4.3.2 Implement Shed .......................................................................................................................... 24

4.3.3 Milking Parlor .............................................................................................................................. 24

4.3.4 Milking Parlor Feeding System ................................................................................................. 25

4.3.5 Holding Yard ............................................................................................................................... 25

4.3.6 Access Road and Tanker Truck Turnaround .......................................................................... 25

5.0 Potable Water Systems .................................................................................................................... 27

5.1 Water Source and Quality .............................................................................................................. 27

5.2 Livestock Water Distribution System ............................................................................................ 27
Nutrient Balance Analysis
May 24, 2016

6.0 Irrigation.............................................................................................................................................. 29
  6.1 Pivot Irrigation System.................................................................................................................. 29
  6.2 Gun Irrigation System ................................................................................................................... 30
  6.3 Non-Irrigated Areas (Pasture and Non-Pasture) ...................................................................... 30
  6.4 Irrigation Setbacks ......................................................................................................................... 34
  6.5 Irrigation Areas .............................................................................................................................. 34
  6.6 Irrigation Demand ......................................................................................................................... 35

7.0 Wastewater Management ................................................................................................................. 39
  7.1 Effluent/Manure Volume ................................................................................................................. 40
  7.2 Effluent Ponds .................................................................................................................................... 43
    7.2.1 Pond Operation and Sizing Criteria ......................................................................................... 44
    7.2.2 Settling Pond Size .................................................................................................................... 47
    7.2.3 Storage Pond Size .................................................................................................................... 48
    7.2.4 Effluent Pond Design ................................................................................................................. 50
    7.2.5 Emergency Spillway and Secondary Berm ............................................................................. 51

8.0 Nutrient Management ....................................................................................................................... 53
  8.1 Historical Background ....................................................................................................................... 53
  8.2 HDF Pasture-Based Dairy Background .......................................................................................... 54
  8.3 Nutrient Balance................................................................................................................................. 54
    8.3.1 NMP Basis of Design .................................................................................................................. 56
    8.3.2 Data Acquisition .......................................................................................................................... 56
    8.3.3 Manure Excrete Models ............................................................................................................. 56
    8.3.4 Manure Model Analysis and Outputs ..................................................................................... 56
    8.3.5 Grass Yields ................................................................................................................................. 61
    8.3.6 Grass Nutrient Content .............................................................................................................. 63
    8.3.7 Soils Analysis ............................................................................................................................... 63
    8.3.8 Soils Risk Assessment Classification ....................................................................................... 64
    8.3.9 Nutrient Mass Balance ............................................................................................................... 66

8.4 Nutrient Application ........................................................................................................................... 72
    8.4.1 Typical Liquid Effluent Application ........................................................................................ 76
    8.4.2 Liquid Effluent Application during the Winter Season ............................................................. 77
Nutrient Balance Analysis
May 24, 2016

Figure 13A – 699 Cow Dairy Facility Water Flow Schematic ............................................................ 42
Figure 13B – 2,000 Cow Dairy Facility Water Flow Schematic .......................................................... 43
Figure 14A - Settling Pond Typical Section and Volumes for 699-cow Herd Scenario...............47
Figure 14B - Settling Pond Typical Section and Volumes for 2,000-cow Herd Scenario ..........48
Figure 15A- Storage Pond Typical Section and Volumes for 699-cow Herd Scenario ..........49
Figure 15B - Storage Pond Typical Section and Volumes for 2,000-cow Herd Scenario ............49
Figure 16 - Effluent Pond Plan ............................................................................................................... 51
Figure 17 - Effluent Ponds Section ...................................................................................................... 51
Figure 18A – Nutrient Management Map (699-cow Herd Size Scenario).................................74
Figure 18B – Nutrient Management Map (Up To 2,000-cow Herd Size Scenario) .................75
Figure 19A – Slurry Management Map (699-cow Herd Size Scenario) .....................................81
Figure 19B – Slurry Management Map (Up To 2,000-cow Herd Size Scenario) .....................82

LIST OF TABLES

Table 1 – Average Monthly Precipitation Data ............................................................................. 10
Table 2 – NOAA 24-Hour Rainfall Data ......................................................................................... 10
Table 3 – NOAA Rain Gauge Data ................................................................................................ 11
Table 4 – NOAA Average Monthly Precipitation Data ................................................................. 12
Table 5 – Evaporation Rates .......................................................................................................... 13
Table 6 – Soil Characteristics Summary ....................................................................................... 14
Table 7 – Land Use Summary ........................................................................................................ 16
Table 8 – Paddock Area Summary ............................................................................................... 18
Table 9 – Irrigated Pasture Area Summary .................................................................................. 35
Table 10 – Non-Irrigated Pasture Area Summary ........................................................................ 35
Table 11 – Irrigation Area Summary ............................................................................................ 35
Table 12 – Monthly Irrigation Demand ....................................................................................... 37
Table 13 – Manure Produced in the Milking Parlor and Yard for Mature Dairy Cows ..........41
Table 14 – Manure Produced in the Calf Sheds for Calves .......................................................... 41
Table 15 – Wash Water Produced in the Milking Parlor, Yards, and Calf Sheds ......................42
Table 16 – Total Wastewater Volume at the Dairy Facility .......................................................... 42
Table 17 – Effluent Pond Size Criteria .......................................................................................... 46

iv
Nutrient Balance Analysis
May 24, 2016

Table 18A – Nutrient Characteristics of Manure for a Mature Dairy Cow.............. 57
Table 18B – Nutrient Characteristics of Manure for a Calf................................. 57
Table 19A – Estimated Waste Generation of a Mature Dairy Cow..................... 57
Table 19B – Estimated Waste Generation of a Calf.......................................... 58
Table 20 – Rainfall and Captured Runoff Inputs.............................................. 58
Table 21A – Monthly Waste Generation Collected in Manure Storage System (699)........... 59
Table 21B – Monthly Waste Generation Collected in Manure Storage System (2,000)... 60
Table 22A – Hawai‘i Dairy Farms Nutrient Mass Balance for 699 Mature Dairy Cows and 125 calves in Pens and Pasture................................................................. 69
Table 22B – Hawai‘i Dairy Farms Nutrient Mass Balance for 2,000 Mature Dairy Cows and 500 calves in Pens and Pasture..................................................... 70
Table 23A – Summary Nutrient Mass Balance for up to 699 Mature Dairy Cows........ 73
Table 23B – Summary Nutrient Mass Balance for up to 2,000 Mature Dairy Cows....... 73
Table 24A – Typical Liquid Effluent Application................................................. 77
Table 24B – Maximized Liquid Effluent Application in Winter........................... 78
Table 25 – Estimated Monthly Nutrient Generation Collected in Manure Storage System
(Operational) for 699 Mature Dairy Cows and 50 Calves in Pens............................. 85
Table 26A – Estimated Monthly Nutrient on Non-Irrigated Areas for 699 Mature Dairy Cows and 50 Calves in Pen............................................................... 86
Table 26B - Estimated Monthly Nutrient Application on Center Pivot Areas for 699 Mature Dairy Cows and 50 Calves in Pen......................................................... 87
Table 26C - Estimated Monthly Nutrient Application on Slurry Areas for 699 Mature Dairy Cows and 50 Calves in Pen............................................................ 88
Table 27 – Estimated Monthly Nutrient Generation Collected in Manure Storage System
(Operational) for 2,000 Mature Dairy Cows and 167 Calves in Pens....................... 89
Table 28A - Estimated Monthly Nutrient on Non-Irrigated Areas for 2,000 Mature Dairy Cows and 167 Calves in Pen............................................................... 90
Table 28B - Estimated Monthly Nutrient Application on Center Pivot Areas for 2,000 Mature Dairy Cows and 167 Calves in Pen......................................................... 91
Table 28C – Estimated Monthly Nutrient Application on Slurry Areas for 2,000 Mature Dairy Cows and 167 Calves in Pen............................................................ 92
1.0 Project Overview

In late 2013, Ulupono Initiative made the investment to fund Hawai‘i Dairy Farms, the first pasture-based, rotational-grazing dairy in the state. Hawai‘i Dairy Farms, LLC (HDF) was formed as a positive step toward the island state’s food security, economic diversity, and sustainability. At steady-state production with 699 milking cows, the farm will produce roughly 1.2 million gallons annually. HDF will reduce Hawai‘i’s reliance on imported milk from the mainland United States by increasing current fresh local milk production by approximately 33 percent. The farm will be based on the most successful island dairy models in the world, and will utilize a sustainable, pasture-based rotational-grazing system and 21st century technology. The farm will be very different from conventional feedlot dairy operations.

HDF is committed to establishing a herd of up to 699 mature dairy cows, and demonstrating the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State of Hawai‘i, Department of Health (DOH) is required. The application process for a National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) permit includes public notification and input. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is currently estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The project will be located in the Māhā‘ulepū Valley on the island of Kaua‘i, exclusively within the approximate 556.8 acres of land leased by HDF from Mahaulepu Farm LLC. See Figure 1 - Vicinity Map.
The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that livestock and grazing activities are contained within the project area. The project area has historically been used for agriculture, including commercial sugar cane production for over one hundred years, and is comprised of lands designated pursuant to the Hawai‘i State Constitution as Important Agricultural Lands. Accordingly, the project is consistent not only with past agricultural use of the area, but with ongoing constitutionally recognized interest in maintaining and utilizing the area for agricultural purposes that promote agricultural self-sufficiency.

Unlike traditional conventional feed-lot dairies, in which mature dairy cows are confined and fed only feed such as grain, hay and silages, the project will be the first dairy in the State to utilize rotational, pasture-based grazing. The rotational, pasture-based grazing approach is a system that involves regularly rotating cows through farm paddocks, where they will primarily feed on locally grown grass, supplemented with grain and vitamins as needed. This approach optimizes grass growth, cow health and milk production, facilitates even applications of waste products for fertilization, prevents over-grazing and over-application of fertilizers, and maintains erosion and runoff controls.

The initial herd of up to 699 mature dairy cows will be divided into groups and rotated through a series of paddocks over an 18-day period to access fresh grass and deposit manure throughout the area. Cows will move through a system of raceways to and from the milking parlor, where they will be milked twice a day for a total of two hours. The remaining dry cows, heifers and 90-day and older calves will be managed off-property on existing ranches that are owned and operated by other local ranchers.

HDF has prepared this Nutrient Balance Analysis for its Environmental Impact Statement (EIS), to disclose the planned waste management systems to support the initial herd operation as well as full-production (up to the carrying capacity of the land) operation. The analysis has been based upon the “Guidelines for Livestock Waste Management”, prepared by the University of Hawai‘i-Mānoa Cooperative Extension Service, College of Tropical Agriculture and Human Resources (CTAHR) in consultation with the State of Hawai‘i Department of Health.
Figure 1 – Vicinity Map
Figure 2 – Project Location Map
2.0 Existing Conditions

The project area has historically been used for sugar cane production as part of the Kōloa Plantation until the late 1990s when the Kōloa Mill closed. Since the mill closed, the project area has been leased to various tenants for ranching and diversified agricultural operations. A small plot of land in the lower center of the valley is currently used for taro lo‘i and will continue to be leased and farmed after the dairy and related pastures are in full operation. See Figure 2 – Project Location Map.

The original agricultural infrastructure from the sugar plantation is largely still in place and continues to be used for on-going agricultural activities. Much of this existing infrastructure will also be used for the dairy, but with a significant amount of upgrades and improvements. The existing infrastructure in the project area includes: gravel and dirt access roads, field roads, water wells, reservoirs, pipelines, pumps, irrigation ditches, drainage ways and culverts.

2.1 Topography

The project site is situated in the Māhāʻulepū Valley on the island of Kauaʻi. The valley is on the leeward side of the Hāʻupu mountain ridge, which runs in the east-west direction, and the valley is also flanked by ridge lines on both sides. Mt. Hāʻupu is the highest point on the ridge line at the back of the valley with an elevation of 2,297 feet. From this point, the ground drops very quickly down to the bottom of the valley to about an elevation of 150 feet. The base of the valley itself is somewhat gradually sloped from an elevation of 150 feet to an elevation of 60 feet along Māhāʻulepū Road on the makai side of the project site near the taro farm. See Figure 3 - USGS Map.
2.2 Water Resources

The Māhāʻulepū Valley has been in agricultural use for decades and much of the water resources and infrastructure in the valley are man-made and were constructed to provide irrigation water for commercial sugar cane cultivation throughout the valley. Systems of ditches, reservoirs and irrigation pipes and pumps are still in place and are still used to provide water to the existing taro ponds, and to irrigate fields and pasture. Existing groundwater wells, monitoring wells, and drainage ways and water bodies are shown on Figure 4. See Figure 4 - Water Resources.

2.2.1 Receiving Water Body State Water Quality

The drainage ways and ditches within Māhāʻulepū Valley and within the project site are not classified for protection by the Department of Health. These canals and ditches flow in the makai direction, beyond the project site, across Māhāʻulepū Road, and into the adjacent agricultural lands. The unnamed drainage ways from the valley all converge near Puʻu Keke and are discharged into marine waters along the Māhāʻulepū coastline between Kamala Point and Punahoa Point.

This stretch of open coastal waters is classified as Class A for water quality standards in HAR §11-54, which states: “the objective of Class A [marine] waters is that their use for recreational purposes and aesthetic enjoyment be protected. Any other use shall be permitted as long as it is compatible with the protection and propagation of fish, shellfish, and wildlife, and with the recreation in and on these waters. These waters shall not act as receiving waters for any discharge which has not received the best degree of treatment or control compatible with the criteria established for this class” (DOH, 2014).

2.2.2 Wetlands

Biological resources, including aquatic systems and wetlands, are discussed in the Flora and Fauna, Biological Survey, conducted by Rana Biological Consulting (2016) under separate cover.

2.2.3 Water Wells

The State Department of Land and Natural Resources (DLNR) Commission on Water Resource Management (CWRM) manages and tracks water resources in the State including groundwater
wells. The State database identifies two primary well sites in the Māhā‘ulepū Valley. The Kōloa F Well is a public drinking water source used by the County of Kaua‘i Department of Water Supply. The Māhā‘ulepū Well site includes up to 14 groundwater wells drilled by the sugar cane plantations. The water wells are shown on **Figure 4 - Water Resources**. The Kōloa F well is located over 0.5 miles away from the dairy facility including the milking parlor, and is approximately 580 feet from the westernmost boundary of the farm. Though not required by DOH or the “Guidelines for Livestock Waste Management”, prepared by the CTAHR, a setback of 1,000 feet will be provided around Kōloa F from any pasture activities, application of effluent, or livestock grazing (the guidelines require a minimum 50’ setback for public water drinking sources from land application of effluent).

Existing monitoring wells, recently installed prior to the commencement of the EIS, are located on the project site. **See Figure 4 - Water Resources**. Groundwater resources are discussed in the “Estimates of the Potential Impact on Groundwater and Surface Water by Hawaii Dairy Farms in Mahaulepu, Kauai” report, conducted by Tom Nance Water Resource Engineering (2016).
Figure 4 – Water Resources
2.3 Rainfall Data

The data sources used for sizing of the waste management systems at the dairy facility site and for pasture irrigation scheduling are described in this section.

2.3.1 Normal Precipitation

Normal monthly precipitation depths at the dairy facility were obtained from the University of Hawai‘i Rainfall Atlas of Hawai‘i (2011). The average monthly precipitation depths will be used for sizing of the waste management systems and irrigation scheduling as required by the Guidelines.

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<td>June</td>
<td>2.86</td>
</tr>
<tr>
<td>July</td>
<td>3.13</td>
</tr>
<tr>
<td>August</td>
<td>3.20</td>
</tr>
<tr>
<td>September</td>
<td>3.25</td>
</tr>
<tr>
<td>October</td>
<td>4.96</td>
</tr>
<tr>
<td>November</td>
<td>6.01</td>
</tr>
<tr>
<td>December</td>
<td>5.71</td>
</tr>
<tr>
<td>Annual</td>
<td>49.95</td>
</tr>
</tbody>
</table>

2.3.2 NOAA 24-Hour Rainfall

Precipitation depths at the dairy facility, for various durations and recurrence intervals were obtained from NOAA Atlas 14, Volume 4, Version 3. The 25-year 24-hour precipitation data will be used for sizing of waste management systems as required by the Guidelines.

<table>
<thead>
<tr>
<th>Storm Event (Recurrence Interval)</th>
<th>Storm Duration</th>
<th>1-hour</th>
<th>24-hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-year</td>
<td></td>
<td>1.18&quot;</td>
<td>3.47&quot;</td>
</tr>
<tr>
<td>2-year</td>
<td></td>
<td>1.55&quot;</td>
<td>4.78&quot;</td>
</tr>
<tr>
<td>10-year</td>
<td></td>
<td>2.54&quot;</td>
<td>8.18&quot;</td>
</tr>
<tr>
<td>25-year</td>
<td></td>
<td>3.17&quot;</td>
<td>10.4&quot;</td>
</tr>
<tr>
<td>50-year</td>
<td></td>
<td>3.70&quot;</td>
<td>12.2&quot;</td>
</tr>
<tr>
<td>100-year</td>
<td></td>
<td>4.25&quot;</td>
<td>14.1&quot;</td>
</tr>
</tbody>
</table>
2.3.3 NOAA Rain Gauge Data

Rain gauge data was obtained from NOAA National Climatic Data Center for the Māhāʻulepū 941.1 rain gauge located on the farm off of Māhāʻulepū Road (GHCND:USC00515710 - MĀHĀʻULEPŪ 941.1 HI US). The rain gauge is located at: Elevation = 24.4, Latitude = 21.90194, Longitude = -159.42111. The data record analyzed included daily precipitation records from 1/1/1984 to 12/31/2013 for a total of approximately 10,957 days (30 years). The rainfall events were ranked based on days of consecutive rainfall (DAPR) and the corresponding multiday precipitation total (MDPR). The data suggests that having more than a week of consecutive rain is very unusual for Māhāʻulepū Valley with this only having occurred 5 times in the last 30 years.

<table>
<thead>
<tr>
<th>DATE</th>
<th>MDPR, in</th>
<th>DAPR</th>
<th>Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>19960108</td>
<td>1.90</td>
<td>17</td>
<td>1</td>
</tr>
<tr>
<td>19920922</td>
<td>2.60</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>19930104</td>
<td>3.70</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>19960930</td>
<td>0.20</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>19980105</td>
<td>1.48</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>19920928</td>
<td>0.02</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>19940105</td>
<td>0.03</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>19960923</td>
<td>0.03</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>19970106</td>
<td>0.05</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>20031229</td>
<td>0.20</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>19861229</td>
<td>0.04</td>
<td>5</td>
<td>21</td>
</tr>
</tbody>
</table>

MDPR – Multiday precipitation total  
DAPR – Number of days included in the multiday precipitation total (MDPR)  
Occurrence – number of occurrences in 10,957 day record between 1/1/1984 to 12/31/2013
Daily rain gauge data from Māhā‘ulepū was utilized to determine the irrigation water balance. The average monthly precipitation data recorded from the Māhā‘ulepū Station 941.1 are as follows:

<table>
<thead>
<tr>
<th>Month</th>
<th>Mean Monthly Rainfall (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>4.22</td>
</tr>
<tr>
<td>February</td>
<td>3.70</td>
</tr>
<tr>
<td>March</td>
<td>5.35</td>
</tr>
<tr>
<td>April</td>
<td>3.17</td>
</tr>
<tr>
<td>May</td>
<td>2.61</td>
</tr>
<tr>
<td>June</td>
<td>2.39</td>
</tr>
<tr>
<td>July</td>
<td>2.77</td>
</tr>
<tr>
<td>August</td>
<td>2.98</td>
</tr>
<tr>
<td>September</td>
<td>2.73</td>
</tr>
<tr>
<td>October</td>
<td>3.99</td>
</tr>
<tr>
<td>November</td>
<td>4.66</td>
</tr>
<tr>
<td>December</td>
<td>5.69</td>
</tr>
<tr>
<td>Annual</td>
<td>44.26</td>
</tr>
</tbody>
</table>

### 2.4 Evaporation Data

Pan evaporation data was obtained from State of Hawai‘i DLNR Pan Evaporation Report R74 dated August 1985 for station Māhā‘ulepū 940.00. Evapotranspiration data was obtained from UH Mānoa Department of Geography, 2014 Evapotranspiration Maps (Lat 21.907N, 159.422W). Potential evapotranspiration data (ETo) for a grass reference was used – as the site will have an all grass crop, and then the rate was further adjusted for Kikuyu grass using a crop coefficient of 0.85 to determine an evapotranspiration rate for Kikuyu crop (ETc).
## Table 5 - Evaporation Rates

<table>
<thead>
<tr>
<th>Month</th>
<th>Days</th>
<th>ETo, Grass Reference in</th>
<th>ETc, Crop in</th>
<th>Māhā‘ulepū 940 in</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>31</td>
<td>6.877</td>
<td>5.845</td>
<td>5.14</td>
</tr>
<tr>
<td>February</td>
<td>28</td>
<td>6.819</td>
<td>5.796</td>
<td>5.65</td>
</tr>
<tr>
<td>March</td>
<td>31</td>
<td>7.850</td>
<td>6.673</td>
<td>6.93</td>
</tr>
<tr>
<td>April</td>
<td>30</td>
<td>7.967</td>
<td>6.772</td>
<td>7.43</td>
</tr>
<tr>
<td>May</td>
<td>31</td>
<td>8.864</td>
<td>7.534</td>
<td>7.82</td>
</tr>
<tr>
<td>June</td>
<td>30</td>
<td>9.053</td>
<td>7.695</td>
<td>8.05</td>
</tr>
<tr>
<td>July</td>
<td>31</td>
<td>9.394</td>
<td>7.985</td>
<td>9.10</td>
</tr>
<tr>
<td>August</td>
<td>31</td>
<td>9.409</td>
<td>7.998</td>
<td>9.37</td>
</tr>
<tr>
<td>September</td>
<td>30</td>
<td>9.092</td>
<td>7.728</td>
<td>8.23</td>
</tr>
<tr>
<td>October</td>
<td>31</td>
<td>8.600</td>
<td>7.310</td>
<td>7.33</td>
</tr>
<tr>
<td>November</td>
<td>30</td>
<td>7.037</td>
<td>5.981</td>
<td>6.17</td>
</tr>
<tr>
<td>December</td>
<td>31</td>
<td>7.101</td>
<td>6.036</td>
<td>5.40</td>
</tr>
<tr>
<td>Total</td>
<td>365</td>
<td>98.063</td>
<td>83.354</td>
<td>86.62</td>
</tr>
</tbody>
</table>

### 2.5 Flood Hazards

The entire project area is located within Federal Emergency Management Agency (FEMA) Zone X based on FEMA Flood Insurance Rate Map (FIRM) panels 1500020316E and 1500020318F. Zone X includes areas determined to be outside the 0.2% annual chance floodplain.

### 2.6 Soils

According to the United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) survey data, the project area consists of a variety of soils. Soil characteristics are summarized in the table below. See Figure 5 - Soil Map.
## Table 6 – Soil Characteristics Summary

<table>
<thead>
<tr>
<th>Soil Classification</th>
<th>Soil Classification</th>
<th>Slope Range (%)</th>
<th>Hydrologic Soils Group</th>
<th>Drainage Class</th>
<th>Depth to Water Table (inches)</th>
<th>Capacity to transmit water – Ksat (in/hr)</th>
<th>Typical Soil Profile - Layer 1 (depth from surface)</th>
<th>Typical Soil Profile - Layer 2 (depth from surface)</th>
<th>Typical Soil Profile - Layer 3 (depth from surface)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hanamaulu Silty Clay</td>
<td>HsD</td>
<td>15 to 20%</td>
<td>B</td>
<td>Well Drained</td>
<td>&gt; 80”</td>
<td>0.14 to 1.98</td>
<td>0 to 11” Silty Clay</td>
<td>11 to 36” Silty Clay</td>
<td>36 to 72” Silty Clay Loam</td>
</tr>
<tr>
<td>Hanamaulu Stony Silty Clay</td>
<td>HtE</td>
<td>10 to 35%</td>
<td>B</td>
<td>Well Drained</td>
<td>&gt; 80”</td>
<td>0.20 to 2.00</td>
<td>0 to 11” Stony Silty Clay</td>
<td>11 to 36” Silty Clay</td>
<td>36 to 72” Silty Clay Loam</td>
</tr>
<tr>
<td>Ka‘ena Clay, Brown Variant</td>
<td>KavB</td>
<td>1 to 6%</td>
<td>D</td>
<td>Poorly Drained</td>
<td>24 to 60”</td>
<td>0.00 to 0.20</td>
<td>0 to 10” Clay</td>
<td>10 to 37” Stony Clay</td>
<td>37 to 54” Stony Clay</td>
</tr>
<tr>
<td>Ka‘ena Clay, Brown Variant</td>
<td>KavC</td>
<td>6 to 12%</td>
<td>D</td>
<td>Poorly Drained</td>
<td>24 to 60”</td>
<td>0.00 to 0.20</td>
<td>0 to 10” Clay</td>
<td>10 to 37” Stony Clay</td>
<td>37 to 54” Stony Clay</td>
</tr>
<tr>
<td>Kalapa Silty Clay</td>
<td>KdF</td>
<td>40 to 70%</td>
<td>B</td>
<td>Well Drained</td>
<td>&gt; 80”</td>
<td>0.00 to 0.20</td>
<td>0 to 10” Silty Clay</td>
<td>10 to 60” Silty Clay</td>
<td></td>
</tr>
<tr>
<td>Kalihi Clay</td>
<td>Ke</td>
<td>n/a</td>
<td>D</td>
<td>Poorly Drained</td>
<td>24 to 60”</td>
<td>0.06 to 0.60</td>
<td>0 to 16” Clay</td>
<td>16 to 70” Clay</td>
<td></td>
</tr>
<tr>
<td>Kalapa Very Rocky Silty Clay (Very Rocky)</td>
<td>KEHF</td>
<td>40 to 70%</td>
<td>B</td>
<td>Well Drained</td>
<td>&gt; 80”</td>
<td>0.00 to 0.20</td>
<td>0 to 10” Clay</td>
<td>10 to 60” Clay</td>
<td></td>
</tr>
<tr>
<td>Kalapa Very Rocky Silty Clay (Rock Outcrop)</td>
<td>KEHF</td>
<td>40 to 70%</td>
<td>D</td>
<td></td>
<td>0.00 to 0.06</td>
<td>0 to 60” Bedrock</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lualualei Clay</td>
<td>LuB</td>
<td>2 to 6%</td>
<td>D</td>
<td>Well Drained</td>
<td>&gt; 80”</td>
<td>0.00 to 0.20</td>
<td>0 to 10” Clay</td>
<td>10 to 60” Clay</td>
<td></td>
</tr>
<tr>
<td>Pakala Clay Loam</td>
<td>PdA</td>
<td>0 to 2%</td>
<td>B</td>
<td>Well Drained</td>
<td>&gt; 80”</td>
<td>0.60 to 1.98</td>
<td>0 to 16” Clay</td>
<td>16 to 60” Silty Clay Loam</td>
<td></td>
</tr>
<tr>
<td>Pakala Clay Loam</td>
<td>PdC</td>
<td>2 to 10%</td>
<td>B</td>
<td>Well Drained</td>
<td>&gt; 80”</td>
<td>0.60 to 1.98</td>
<td>0 to 16” Clay</td>
<td>16 to 60” Silty Clay Loam</td>
<td></td>
</tr>
<tr>
<td>Rock Land</td>
<td>rRK</td>
<td>n/a</td>
<td>D</td>
<td>Well Drained</td>
<td>&gt; 80”</td>
<td>0.00 to 0.06</td>
<td>0 to 4” Silty Clay</td>
<td>4 to 8” Silty Clay</td>
<td>8 to 20” Bedrock</td>
</tr>
<tr>
<td>Rock Land (Rock Outcrop)</td>
<td>rRK</td>
<td>n/a</td>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waikomo Stony Silty Clay</td>
<td>Ws</td>
<td>n/a</td>
<td>D</td>
<td>Well Drained</td>
<td>&gt; 80”</td>
<td>0.00 to 0.06</td>
<td>0 to 14” Silty Clay</td>
<td>14 to 20” Silty Clay Loam</td>
<td>20 to 30” Bedrock</td>
</tr>
</tbody>
</table>
Figure 5 – Soils Map

Legend

Soil Types

- HsD: Hanamaulu silty clay, 15 - 25 % slopes
- HtE: Hanamaulu stony silty clay, 10 to 35 % slopes
- KEHF: Kalapa very rocky silty clay, 40 - 70 % slopes
- KavB: Kaena clay, brown variant, 1 - 6 % slopes
- KavC: Kaena clay, brown variant, 6 - 12 % slopes
- Kdf: Kalapa silty clay, 40 - 70 % slopes
- Ke: Kalihi clay
- LuB: Lualualei clay, 2 - 6 % slopes
- PdA: Pakala clay loam, 0 - 2 % slopes
- PdC: Pakala clay loam, 2 - 10 % slopes
- Ws: Waikomo stony silty clay

3.0 Land Use Summary

The total dairy farm area inclusive of pasture and dairy facility, but excluding the existing taro farm, is 556.8 acres. The dairy project site has been divided into two land use areas as described in Table 7 (below): The farm area consists of 547.1 acres for pasture, roads, and setbacks and 9.7 acres for the dairy facility. See Figure 6 - Paddock Map.

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Farm</strong></td>
<td></td>
</tr>
<tr>
<td>Paddocks / Pasture</td>
<td>469.9</td>
</tr>
<tr>
<td>Cow Races, Farm Roads, Drainage Ways &amp;</td>
<td>77.2</td>
</tr>
<tr>
<td>Setbacks / Vegetated Buffers</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>547.1</td>
</tr>
<tr>
<td><strong>Headquarters / Dairy Facility</strong></td>
<td></td>
</tr>
<tr>
<td>Milking Parlor, Yards, Sheds, Road, Ponds</td>
<td>9.7</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>9.7</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>556.8</td>
</tr>
</tbody>
</table>

The farm is broken up into a total of 119 paddocks, the majority of which are approximately 3 to 5 acres in size. Paddocks smaller in size near the dairy facility would be used for temporary holding for calves less than 90 days old, prior to moving off of the farm, or for temporary holding for other mature dairy cows. See Figure 6 - Paddock Map and Table 8 - Paddock Area Summary. Other land uses within the farm areas include the cow races, walkways, farm roads, drainage ways, animal cemetery, and effluent ponds. The animal cemetery is located on paddock 163 and is included in the total paddock area.
Figure 6 – Paddock Map
Table 8 – Paddock Area Summary

<table>
<thead>
<tr>
<th>Field</th>
<th>Acres</th>
<th>Field</th>
<th>Acres</th>
<th>Field</th>
<th>Acres</th>
<th>Field</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>P 101</td>
<td>3.62</td>
<td>P 133</td>
<td>4.26</td>
<td>P 202</td>
<td>3.60</td>
<td>P 234</td>
<td>4.64</td>
</tr>
<tr>
<td>P 102</td>
<td>1.12</td>
<td>P 134</td>
<td>4.73</td>
<td>P 203</td>
<td>3.99</td>
<td>P 235</td>
<td>4.62</td>
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<tr>
<td>P 103</td>
<td>4.47</td>
<td>P 135</td>
<td>4.74</td>
<td>P 204</td>
<td>3.40</td>
<td>P 236</td>
<td>4.67</td>
</tr>
<tr>
<td>P 104</td>
<td>4.54</td>
<td>P 136</td>
<td>4.78</td>
<td>P 205</td>
<td>6.01</td>
<td>P 237</td>
<td>5.04</td>
</tr>
<tr>
<td>P 105</td>
<td>3.08</td>
<td>P 137</td>
<td>4.81</td>
<td>P 206</td>
<td>6.04</td>
<td>P 238</td>
<td>6.14</td>
</tr>
<tr>
<td>P 106</td>
<td>2.94</td>
<td>P 138</td>
<td>5.06</td>
<td>P 207</td>
<td>4.17</td>
<td>P 239</td>
<td>7.63</td>
</tr>
<tr>
<td>P 107</td>
<td>3.02</td>
<td>P 139</td>
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<td>4.41</td>
<td>P 301</td>
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<tr>
<td>P 108</td>
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<td>P 140</td>
<td>6.57</td>
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<td>0.55</td>
<td>P 302</td>
<td>3.94</td>
</tr>
<tr>
<td>P 109</td>
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<td>P 141</td>
<td>4.76</td>
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<td>0.59</td>
<td>P 303</td>
<td>3.65</td>
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<tr>
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<td>P 142</td>
<td>4.93</td>
<td>P 211</td>
<td>0.63</td>
<td>P 304</td>
<td>3.97</td>
</tr>
<tr>
<td>P 111</td>
<td>3.04</td>
<td>P 143</td>
<td>4.32</td>
<td>P 212</td>
<td>0.52</td>
<td>P 305</td>
<td>4.01</td>
</tr>
<tr>
<td>P 112</td>
<td>4.19</td>
<td>P 144</td>
<td>3.94</td>
<td>P 213</td>
<td>0.51</td>
<td>P 306</td>
<td>4.16</td>
</tr>
<tr>
<td>P 113</td>
<td>4.12</td>
<td>P 145</td>
<td>3.87</td>
<td>P 214</td>
<td>0.48</td>
<td>P 307</td>
<td>4.11</td>
</tr>
<tr>
<td>P 114</td>
<td>3.80</td>
<td>P 146</td>
<td>3.43</td>
<td>P 215</td>
<td>4.24</td>
<td>P 308</td>
<td>4.02</td>
</tr>
<tr>
<td>P 115</td>
<td>4.51</td>
<td>P 147</td>
<td>3.89</td>
<td>P 216</td>
<td>4.54</td>
<td>P 309</td>
<td>4.55</td>
</tr>
<tr>
<td>P 116</td>
<td>4.29</td>
<td>P 148</td>
<td>3.88</td>
<td>P 217</td>
<td>4.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 117</td>
<td>3.29</td>
<td>P 149</td>
<td>4.11</td>
<td>P 218</td>
<td>4.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 118</td>
<td>4.54</td>
<td>P 150</td>
<td>4.17</td>
<td>P 219</td>
<td>4.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P 119</td>
<td>3.06</td>
<td>P 151</td>
<td>4.23</td>
<td>P 220</td>
<td>4.32</td>
<td>P 313</td>
<td>3.00</td>
</tr>
<tr>
<td>P 120</td>
<td>3.49</td>
<td>P 152</td>
<td>3.44</td>
<td>P 221</td>
<td>4.30</td>
<td>P 314</td>
<td>3.01</td>
</tr>
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4.0 Farm Description

Dairy-related facilities will occupy approximately 9.7 acres along the western boundary of the project area. Buildings will include a milking parlor/barn with a rotary milking platform and milk storage tanks, two calf sheds, and an implementation shed for tools and equipment. Manure captured during the milking process will be transferred through underground pipes to two nearby effluent ponds, where solids will be settled out and the remaining fluid stored for application to the pasture through the irrigation system. When applied via the irrigation system, non-potable water from the Waita Reservoir will be added to nutrient rich liquid for irrigation use. The effluent ponds will be sealed with a flexible membrane liner, and will be constructed within a secondary containment berm. Paved access roads and a truck turnaround area for milk tanker trucks, feed silos, and a holding yard for cows waiting to enter the milking parlor will also be part of the project.

Agricultural infrastructure from prior sugar cane cultivation within the project area, such as gravel access roads, field roads, reservoirs, pipelines, irrigation ditches, drainage ways and culverts, will be adapted for reuse where possible. Additional field improvements will include a livestock water distribution system, pivot irrigation system, culverts and perimeter and paddock fencing.

The majority of the dairy farm area (i.e. ~83%) is dedicated to pasture. Much of the remaining area is dedicated to access roads, cow races, the dairy facility, and waterway setback / buffers. The dairy facility including the parlor, effluent ponds and secondary containment areas is contained within a 9.7-acre area, which represents about 1.7% of the entire farm. The corresponding building areas are under 0.1% of the total farm area. The dairy farm infrastructure is summarized as follows and shown on Figure 7 - Farm Map:

- Paved Access Road and Truck Turnaround
- Cow Walkways/Races and Farm Roads
- Concrete Holding Yards and Gravel Farm Races
- Milking Parlor
- Implement Shed
- Calf Sheds (2)
Nutrient Balance Analysis
May 24, 2016

- Settling Pond and Storage Pond
- Effluent and Sludge Pumps and Distribution System
- Irrigation Water Storage and Distribution System
- Existing Potable Well and Water Line to Milking Parlor
- Potable Water Tank for Milking Parlor and Livestock Consumption
- Livestock Water Distribution System
- Feed Silos
- Milking Parlor - Individual Wastewater System (IWS)
- Animal Cemetery (Located on Paddock 163)
- Paddock fencing and perimeter fencing
4.1 Physical Setbacks for Water Resources

Physical setbacks are incorporated into the farm’s design, where no active pasture, effluent application, or grazing activities will occur, intended to protect and improve water resource quality. Paddock and perimeter fencing, based upon NRCS Conservation Practice Standard specifications, are set back 35 feet from water resources and are designed to keep livestock from entering and polluting water resources. Though not required by the "Guidelines for Livestock Waste Management", HDF has also agreed to provide a 1,000 foot setback from the Kōloa F County Well through an agreement with the County of Kaua‘i, Department of Water (DOW), where no active pasture, effluent application, or grazing activities will occur within 1,000 feet of the County Kōloa F Well.

Restoration of the banks and edges of waterways with plants suitable for site conditions are also incorporated into the farm’s design. These vegetation buffers are intended for erosion and sedimentation control, and removal of pollutants through bio-filtration of runoff. NRCS Conservation Practice Standard specifications will be followed, and plant species will be identified in conjunction with the NRCS District Conservationist.

The setbacks and restorations are part of an approved NRCS Conservation Plan for Hawai‘i Dairy Farms, which consists of NRCS-approved Best Management Practices (BMPs) for farming activities. The following summary of physical setbacks and related NRCS Conservation Practice Standards will be used adjacent to water resources:

- County Well Kolo‘a F – no active pasture, effluent application, or grazing activity within 1,000 feet radius.
- Paddock Fencing – 35 feet from top of bank of the water resource on both sides.
- Re-vegetation of 35-foot Setback – NRCS Conservation Practice Standard 390
Figure 7 – Farm Map
4.2 Cows Walkways and Races

The dairy farm pasture areas will be divided into 3- to 5-acre paddocks as shown on Figure 6 - Paddock Map. A network of walkways and races will connect the paddocks together and provide access to and from the dairy facility. The walkways and races are generally aligned with existing farm roads where possible, but additional walkways and races will be constructed through the existing fields.

The walkways and races will be compacted crushed rock access ways that are approximately 16 to 20 feet in width. The cow races will allow twice daily movement of the cows from the paddocks to the Milking Parlor. The cow races are not irrigated and will be frequently maintained to maximize efficient and rapid movement to and from the dairy with minimal injury to livestock. The races will be bordered by 3 wire electrical fencing.

At waterways and drainage ways, animal crossings will be added consisting of a bridge or culvert, and will be designed to appropriate NRCS Conservation Practice Standards and Codes.

4.3 Dairy Facility

4.3.1 Calf Sheds

Calf sheds will be constructed to provide safe housing for calves at the HDF site, which are kept until approximately 90 days of age. There will be two open bay calf sheds, which will be steel structures with metal roofs on concrete slabs. Each shed will be approximately 81 ft. long by 26 ft. wide by 15 ft. tall. A minimum of approximately 21 sq. ft. area is allocated for each calf and 20 calves will be kept in one pen (approximately 26 ft. x 16 ft.) at any given time. Each pen is divided in two areas (feeding area and bedding area). Overall, the calf sheds will provide capacity for up to 200 calves. The feeding area will be washed daily and wastewater will be transferred to the effluent ponds via drain inlets and conveyance piping. Calf bedding will consist of sand. Calves will transition to pasture near the calf sheds after 3-4 weeks. See Figure 8 - Facility Site Plan.
4.3.2 Implement Shed

An implement shed will be constructed for storage of equipment, tools, and farm machinery parking. The implement shed will be an open bay steel structure with metal roofs on a concrete slab, similar to the calving sheds. The implement shed will be approximately 65 ft. long by 26 ft. wide by 15 ft. tall for a total area of 1,690 sq. ft. See Figure 8 - Facility Site Plan.

4.3.3 Milking Parlor

The Milking Parlor will be the single largest structure on the dairy farm with dimensions of approximately 256 ft. long by 88.5 ft. wide by 33 ft. tall. The Milking Parlor will contain a highly-automated 60-stall rotary, which completes one rotation of 60 cows in approximately 8-10 minutes. It will operate 365 days a year. See Figure 8 - Facility Site Plan.

The initial herd of 699 mature dairy cows will be managed in mobs of 105 – 115 cows according to their calving, lactation, and health status. At full production, if expanded, up to 2,000 mature dairy cows will be managed in mobs of 300 – 330 cows according to their calving, lactation and health status. The mobs will be brought into the holding yard and Milking Parlor twice a day for milking. Each time, an individual cow’s maximum milking time will be 10 minutes and the maximum time off pasture will be 1 hour. The individual milking time of cows will be the same, regardless of the total number of animals on the farm, with total time in the milking parlor corresponding to the total size of the mob and the amount of animals that must be milked in the parlor. Each mob will still be brought into the holding yard and milking parlor twice a day for milking.

The Milking Parlor building includes the following components:

- Covered Loading Area
- Milking Area
- Holding Pens
- Mechanical Room and Pump Room
- Office Space
- Veterinary Space and Storage
- Staff Restrooms
- Milk Storage
4.3.4 Milking Parlor Feeding System

In-parlor feeding will be offered to the cows to provide additional nutrients, which will improve animal health and milk production. Cows will be eager to enter into the parlor where they will receive feed, so the overall milking process time is typically improved. A small portion of feed (6.6 lbs.) will be offered to cows during the milking time (8-10 min), which will be stored in two 44-ton – 60-degree cone silos.

4.3.5 Holding Yard

The holding yard is designed to hold a single 330-cow mob at any one time, and will be approximately 150 ft. long by 82 ft. wide for a total area of 12,300 sq. ft. The holding yard area will be heavily used by livestock and will need to be cleaned frequently. Manure/nutrient-laden water will be transferred to the effluent pond through underground pipes. No feed will be offered in the holding yard and each mob will spend less than one hour in the yard before entering into the Milking Parlor. See Figure 8 - Facility Site Plan.

4.3.6 Access Road and Tanker Truck Turnaround

A new 20-foot wide paved access road / tanker track will be constructed off of the adjacent farm roads to the dairy facility. The access road will serve as the primary access to the dairy and will be used by milk tanker trucks for transport of milk off-site, as well as for supply trucks making deliveries. A paved truck turnaround will be located at the end of the access road and will lead up to a covered loading area where milk will be pumped directly into the trucks. See Figure 8 - Facility Site Plan.
Figure 8 – Site Plan
5.0 Potable Water Systems

Potable water is required for the washing down of the milk parlor and yards, milk cooling, potable consumption within the dairy facility, washing down the calf facility, and for livestock consumption. At the committed herd size of 699 milking cows, approximately 12,163 gallons will be used per day. At the contemplated herd size of 2,000 milking cows, approximately 34,800 gallons will be used per day. The cows on pasture will also consume approximately 25.0 gallons per day for drinking purposes. Daily consumption of the 699 milking cows will be approximately 17,475 gallons. The 2,000-milking cow herd will drink 50,000 gallons per day. The total potable water demand per day will be approximately 29,638 gallons per day at the committed herd size, and about 84,800 gallons per day for the contemplated 2,000-cow herd size.

5.1 Water Source and Quality

Potable water for the dairy facility and livestock consumption must be of acceptable quality per DOH requirements. Water will be sourced from the Māhā’ulepū Well located within the project site. The well site once contained up to 14 wells, drilled for the sugar plantation between 1897 and 1928. Of the 14 wells, only 3 were located and are able to be utilized by HDF. One well will be used for potable water, one will be used for aquifer / deep groundwater monitoring, and one will be used as a backup. The water source has been tested and is of an acceptable quality. Further information on the wells in the area and baseline water quality information is documented in “Estimates of the Potential Impact on Groundwater and Surface Water By Hawaii Dairy Farms in Mahaulepu, Kauai” by Tom Nance Water Resource Engineering (2016).

5.2 Livestock Water Distribution System

Availability of drinking water has an impact on animal health and milk production. The livestock water distribution system has been designed to supply a large volume of water to meet the seasonal high daily water demand of 25 gpd per cow. The total livestock drinking water demand is estimated to be 17,475 gpd for the initial herd of 699 cows, and 50,000 gpd for up to 2,000 mature dairy cows. Two large covered and lined water storage tanks will be located at the Milking Parlor providing total storage of nearly 80,000 gallons.
Nutrient Balance Analysis  
May 24, 2016

Water from the storage tanks will be distributed into the Milking Parlor and to adjacent buildings for dairy use. Water will also be distributed throughout the paddocks for livestock consumption. Small booster pumps will be used to ensure the required flow will be delivered throughout the farm.

Small diameter water mains, 2 to 3 inches in size, will deliver water to the paddocks. Two concrete troughs, at minimum, will be installed in each paddock to give animals easy access to drinking water at all times. Troughs will be raised and placed on a crushed rock base to provide a firm and stable surface for animal movement around the trough. The trough is high enough for the animal to reach over and in, but will discourage the animal from stepping into the trough. The troughs are also fitted with valves to stop the flow of water into the trough when the trough is full and refill the trough as the water is consumed, ensuring maximum water efficiency.
6.0 Irrigation

The total pasture area of the farm is 469.9 acres. The majority of the pasture area will be irrigated with either irrigation water, liquid effluent, or both through either pivot irrigation systems or through gun irrigators with a hard-hose reel, which can be moved throughout the farm as needed. See Figure 9 - Irrigation Map.

6.1 Pivot Irrigation System

The pivot irrigation system will consist of two center pivots. A center pivot irrigation system is an overhead irrigation system, which includes irrigation pipes supported on trusses mounted on wheeled towers that rotate around a central water supply point. The farm will have two pivots; irrigation pivot #1 will be a full circle (FC) pivot and irrigation pivot #2 will be a partial circle (PC) pivot. See Figure 10 - Irrigated Pasture Areas. The irrigation system including irrigation application rates and emitters is controlled using computer software and GPS receivers to allow very precise application of irrigation on the pasture.

The pivot is capable of spraying at a rate of 1,030 gpm, but the pivots can apply irrigation water at different rates depending on the actual irrigation needs of the farm. A somewhat typical application rotation and rate would include a 48-hour rotation and application of up to 0.39 inches of irrigation onto the paddocks. The various components of the central pivot irrigation control system are shown below:
Pivot crossings at waterways and ditches, provided at the wheel track locations, will allow the pivot to traverse the waterway without impact, and consist of an elevated metal track anchored on both sides of the waterway. Pivot tracks will be replanted with grass as required to minimize erosion and sediment runoff.

### 6.2 Gun Irrigation System

The gun irrigation system will utilize a rotating, hard-hose reel gun system in makai areas of the farm, where the center pivots are unable to reach. The gun irrigators can be moved around the farm to provide maximum reach and even distribution of irrigation water to areas not served by the center pivot irrigation system. See Figure 10 - Irrigated Pasture Areas. Gun irrigators will not apply liquid effluent and will utilize irrigation water sourced to the farm, currently from Waita Reservoir. Irrigation water will be filtered and pumped into the gun irrigation system.

A separate rotating, hard-hose reel gun system will be installed for slurry application and is further discussed in Section 8 – Nutrient Management. This system will be used to apply solids from the settling pond where needed to provide nutrients to the paddocks much like commercial fertilizer would be applied, is not relied upon for regular irrigation to meet the daily water demand of the grass crop. The slurry application system will be completely separate from the gun irrigation system in the makai areas of the farm. Because the slurry is used to provide nutrients to the farm, slurry application is discussed later in this report.

### 6.3 Non-Irrigated Areas (Pasture and Non-Pasture)

Approximately 26.2% of the total pasture area will not be irrigated, primarily in the mauka areas of the farm where the pivots are unable to reach. No gun irrigation system will be used in this area. See Figure 11 – Non-Irrigated Areas.

While non-irrigated areas do not receive regular irrigation to meet crop water demands, some non-irrigated pasture areas will still receive water in the form of precipitation as well as nutrients in the form of fertilizer or slurry required for grass growth. Nutrient application rates in this area, as with other pasture areas, will be properly managed to avoid over-application or application around a significant rain event. Application of slurry is discussed in Section 8.4, Nutrient Application.
Figure 9 – Irrigation Map
Figure 10 – Irrigated Pasture Areas
Figure 11 – Non-Irrigated Areas
6.4 Irrigation Setbacks

Irrigation setback distances have been established to limit irrigation activity or irrigation with liquid effluent within specific areas under the pivot or with the rotating gun system. The pivot irrigation systems are configured with GPS-controlled emitters that will turn off so that liquid effluent is not directly applied to the ditches, cow races and any other agricultural or natural water resources. The following liquid effluent setbacks are incorporated into the design and no irrigation of effluent will occur within the distance specified for each of the following:

- County Well Kolo‘a F – **1,000 feet** on all sides (through County DOW agreement)
- Irrigation ditch, agricultural water, and natural water resource - **50 feet** from top of bank of the water resource on both sides.
- Cow walkways and races - **6 feet** on both sides
- Existing taro farm - **20 feet** on all sides

The setback distances from water resources are based upon requirements contained within the “Guidelines for Livestock Waste Management”, by University of Hawai‘i-Mānoa – CTAHR. While the minimum setback distance for the application of effluent from public drinking water sources is 50 feet per the Guidelines, HDF has agreed to increase this setback to 1,000 feet following consultation with the County of Kaua‘i Department of Water.

Therefore, application of liquid effluent in addition is prohibited within 50 feet of water resources on the farm, while application of as-excreted manure (during normal grazing) is prohibited within 35 feet of water resources on the farm by physical setbacks (fencing) previously described in **Section 4.1 – Physical Setbacks for Water Resources**.

6.5 Irrigation Areas

The irrigated pasture areas are summarized in **Table 9 – Irrigated Pasture Area Summary**, below. The non-irrigated pasture areas are summarized in **Table 10 – Non-Irrigated Pasture Area Summary**, below:
Irrigation water is expected to be provided via Waita Reservoir and it is not anticipated that the potable wells from the Māhā’ulepū 14 well site would provide irrigation water to the pivots or to the gun irrigation system.

While non-irrigated areas do not receive regular irrigation to meet crop water demands, some will still receive water in the form of precipitation as well as nutrients in the form of fertilizer or slurry application that is required for grass growth, which will be properly managed to avoid over application or application around a significant rain event. Because the slurry is used to provide nutrients to the farm, slurry application is discussed later in this report.

### 6.6 Irrigation Demand

The irrigation demand will not change depending on the amount of animals on the farm. With a herd size of 699 milking cows or 2,000 milking cows, the same amount of irrigated pasture will be utilized for each rotating mob of dairy cows.

Under typical conditions, the irrigation systems will be designed and sized for an upper-end application rate of 0.24 inches per acre per day on 285.1 acres of pivot area and 61.4 acres of gun
irrigation area, which equates to approximately 2.26 million gallons per day (MGD) of irrigation per day, on average. This demand is used conservatively for infrastructure planning purposes.

The actual amount of applied irrigation and schedule of irrigation days will depend on the number of rain days and amount of precipitation. Therefore, irrigation demand is further examined on a monthly basis for operational purposes, based upon historical rainfall data, the pasture grass crop evapotranspiration (ET) rates, and average monthly precipitation. Effective precipitation is assumed to be up to 0.80 inches of the daily rainfall amount at the Māhāʻulepū Rain Gauge Station 941.1, with the assumption that remaining rainfall greater than 0.80 inches is either lost to deep percolation into the soil or runoff, thereby reducing precipitation available to the crop (Refer to the Estimates of the Potential Impact on Groundwater and Surface Water by Hawaii Dairy Farms in Mahaulepu, Kauai by Tom Nance Water Resource Engineering, 2016).

The calculated monthly irrigation demand is summarized in Table 12 – Monthly Irrigation Demand. The demand indicates a clear deficit in precipitation (and need for irrigation) during the spring, summer and fall seasons with only a modest demand for irrigation during the winter season. Actual irrigation volumes to meet the actual crop demand will likely be approximately 10 - 20% higher than the estimated demand shown below, depending on irrigation equipment efficiency (lost to evaporation) and current conditions. The table below are conservative estimates of irrigation demand without taking into account these factors.
During the wet winter months of November, December and January, the demand for irrigation, and therefore, the frequency of use of the pivot and gun irrigators, is significantly lower than other times of the year. Yet, as there are a number of dry days in those months, irrigation is still required, with an average monthly irrigation demand of between 26.0 MG and 30.3 MG, compared with up to 52.5 MG in the dry summer months.

A weather station is installed on-site, capable of measuring temperature, humidity, rain, wind direction and speed, irradiance and evaporation. Soil moisture meters will also be added to determine the ideal moisture bandwidth for grass growth, and will support irrigation decisions and management.

### Table 12 – Monthly Irrigation Demand

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<th>P in</th>
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**ETo, Grass Reference**  
Monthly evapotranspiration rate (in/mo) for a grass reference obtained from UH Mānoa Dept. of Geography, 2014 Evapotranspiration Maps (Lat 21.907N, 159.422W)

**ETc, Crop**  
Monthly crop evapotranspiration rate (in/mo) for Kikuyu grass calculated using a crop coefficient of 0.85

**P**  
Average rainfall from the 30-year daily record of Māhā‘ulepū Station 941.1 from January 1984 through December 2013.

**Pe**  
Effective precipitation assumed to consist of up to 0.80 inches of rain, shown at the Māhā‘ulepū Station 941.1. Daily amounts greater than 0.80 inches are assumed to become runoff.
Nutrient Balance Analysis
May 24, 2016

The proposed irrigation systems for the farm are high-tech in nature and require significant coordination and calibration prior to and during farm operation. Irrigation for the entire farm will be managed precisely based upon the various factors previously discussed, including but not limited to the amount of precipitation, number of rain days, soil moisture and nutrient content, irrigation supply sources, and effluent pond levels and volumes.

Based upon the demand estimates and methodology above, an Irrigation Water Management Plan, which will detail specific farm operating procedures, will be developed to provide the farm operator a plan for proper management and application of irrigation water to allow efficient use of water, minimize energy consumption, and maximize crop yield. Refer to NRCS Practice Code Standards 430 Irrigation Pipeline, 442 Irrigation System, Sprinkler, & 449 Irrigation Water Management.
The dairy farm is a pasture-based, rotational-grazing operation, and the mature dairy cows spend a limited time in the holding yard and milking parlor. Livestock waste and wastewater generated from the milking parlor, holding yards, and calf sheds, including any stormwater and wash down runoff from these areas, will be collected, stored, and reused on the farm as natural fertilizer. Fundamentally, the wastewater system at the dairy facility recycles 100% of all livestock and wash water from the milking process with no direct discharge into State waters from the dairy facility. The objectives of the design are:

i. To capture all of the animal effluent that is produced at the milking parlor holding areas, and calving sheds.
ii. To spread the effluent on the grazing land to meet the nutrient demand of the crop/pasture
iii. To control the effluent application rate and spread effluent only on the desired areas within the project boundaries
iv. To keep effluent completely separate from potable water to prevent contamination of the potable water sources or storage
v. To comply with all regulatory requirements under the state and federal laws

Figure 12 – Dairy Facility Site Plan
The dairy facility including the wastewater ponds and other infrastructure will be sized and constructed for the capacity of 2,000 mature dairy cows, though the initial herd will start at 699 mature dairy cows. Calculations provided herein will show effluent and nutrient operational values of the dairy farm at a proposed herd size of 699 mature dairy cows as well as the contemplated expansion of up to 2,000 mature dairy cows. Refer to NRCS Practice Code Standard 633 Waste Utilization.

### 7.1 Effluent/Manure Volume

Several criteria serve as the basis of calculating the total amount of manure and effluent that will be collected within the milking parlor, holding yards, and adjacent sheds, and then conveyed to the ponds. The following describes the methodology behind calculating the total manure and effluent volumes, which will need to be accounted for in sizing the waste management ponds in this section, and then managed during reapplication to the pasture areas, as described in Section 8 - Nutrient Management.

HDF is a pasture-based, rotational-grazing dairy farm that is being designed for kiwi-cross animals. A mature kiwi-cross cow’s weight is about 1,200 lbs. and it produces an average of 90.8 lbs. of manure per day or 10.9 gallons of manure per day, or 0.68 gallons average per waking hour. These values were calculated using the Cornell Net Carbohydrate Protein System (CNCPS) model, further discussed in Section 8.3 - Nutrient Balance.

The 699 cows in the initial herd will be maintained in mobs of 105-115 animals and each mob will rotate through a group of 18 paddocks. Under full operation as part of a contemplated herd expansion, up to 2,000 mature dairy cows will be maintained in mobs of 300-330 animals. The cows graze for one day per paddock, so once every 18 days the entire mob will produce the majority of its effluent on that one paddock as it grazes.

Grass-fed dairy cattle produce significantly more liquid manure than cattle fed on concentrate and Kikuyu is also a relatively wet grass (87% water). The total amount of manure produced in the milking platform and holding yards each day is calculated below:
**Table 13: Manure Produced in the Milking Parlor and Yard for Mature Dairy Cows**

<table>
<thead>
<tr>
<th>Initial Herd Size of 699</th>
<th>951 gpd</th>
<th>$699 \times (1 \text{ hr} \times 2 \text{ milkings per day}) \times \text{manure of 0.68 gallon per hour}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contemplated Expansion to 2,000</td>
<td>2,720 gpd</td>
<td>$2,000 \times (1 \text{ hr} \times 2 \text{ milkings per day}) \times \text{manure of 0.68 gallon per hour}$</td>
</tr>
</tbody>
</table>

From a waste volume perspective, a dairy operation should also account for the calves that will be on site. For the committed herd size of 699 milking cows, there will be approximately 150 calves on the HDF site at any one time, 50 of which will be housed within the calf sheds. Should HDF decide, in the future, to expand operations to the contemplated herd of up to 2,000 mature dairy cows, there will be approximately 500 calves at any one time, 167 of which will be housed within the calf sheds. The remainder will be on the pasture grazing, depending on their age, size and health. Once the calves reach 165 lbs or are 90 days old, they will be transferred to an off-site calf raising facility. A calf produces approximately 2.244 gallons of manure per day. Because manure in the calf sheds is conveyed to the effluent pond system, the total amount of manure produced in the calf sheds (for the 699 herd size and 2,000 herd size) is calculated below:

**Table 14: Manure Produced in the Calf Sheds for Calves**

<table>
<thead>
<tr>
<th>Initial Herd Size of 699</th>
<th>112.2 gpd</th>
<th>$50 \text{ calves in pen} \times \text{manure of 2.244 gallon per calf per day}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contemplated Expansion to 2,000</td>
<td>374.7 gpd</td>
<td>$167 \text{ calves in pen} \times \text{manure of 2.244 gallon per calf per day}$</td>
</tr>
</tbody>
</table>

The holding yard and milking parlor are washed twice a day after each milking, and the calf sheds are also periodically washed (collecting manure generated by the calves on-site that are housed in the pens – further discussion of calf manure is discussed in **Section 8 – Nutrient Balance**). All of the manure produced in the milking parlor, yards, and calf sheds is washed out and the nutrient-laden water is transferred to the settling pond. The milk storage tanks located within the milking parlor are also washed out after milk is pumped to tanker trucks for delivery. Wash water from the milk tanks is also transferred to the settling pond. Total wash water from all processes at the parlor, yards, calf sheds (including calf manure), and remaining facility is estimated to be at 17.4 gpd per mature dairy cow.
Table 15: Wash Water Produced in the Milking Parlor, Yards, and Calf Sheds

<table>
<thead>
<tr>
<th>Herd Size</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Herd Size of 699</td>
<td>12,162.6 gpd</td>
</tr>
<tr>
<td>Contemplated Expansion to 2,000</td>
<td>34,800 gpd</td>
</tr>
</tbody>
</table>

Therefore, the total wastewater volume from the manure at the milking parlor, holding yards, calf sheds, machine wash, yard wash, and milking activity wash is summarized below:

Table 16: Total Wastewater Volume at the Dairy Facility

<table>
<thead>
<tr>
<th>Herd Size</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Herd Size of 699</td>
<td>13,225.8 gpd</td>
</tr>
<tr>
<td>Contemplated Expansion to 2,000</td>
<td>37,894.7 gpd</td>
</tr>
</tbody>
</table>

See Figure 13A & B - Water Flow Schematic for a schematic diagram of the water and wastewater flow through the pasture-based, rotational-grazing system. Two diagrams are provided: one for the initial herd size of 699 and one for the contemplated expansion to 2,000.

Figure 13A - Water Flow Schematic for 699 Mature Dairy Cows
Figure 13B - Water Flow Schematic for 2,000 Mature Dairy Cows

All of the manure and wash down water that is collected from the milking facility, yards, and calf sheds is transferred to the effluent ponds, consisting of a two-stage system including a settling pond and a storage pond, prior to application on the pastures through the irrigation system. The sizing and the operation of the effluent ponds is described below:

7.2 Effluent Ponds

The effluent ponds will be constructed for effluent collection, management and proper utilization of nutrients available from livestock waste. The pond design is based on a two-step system, which includes a settling pond and storage pond. The settling pond allows for the settlement and accumulation of wastewater sludge with the overflow of liquid effluent entering the storage pond. The settling pond and storage pond separate solids from liquids and hold the
Nutrient Balance Analysis
May 24, 2016

effluent, respectively, for management purposes. The ponds will be located a minimum distance of 1,000 feet from public drinking water resources and 50 feet from surface water resources as required by the “Guidelines for Livestock Waste Management”, by University of Hawai’i-Mānoa – CTAHR. See Figure 8 - Facility Site Plan.

Sizing of the effluent ponds is highly dependent on the amount of effluent and subsequently the nutrients collected, the normal precipitation collected, and the volume of a 25-year, 24-hour storm event. In turn, sizing of the ponds is dependent on how often and at what rate, the collected effluent and precipitation will be reapplied to the field. As previously discussed, in effect, 100% of all manure and effluent captured at the dairy facility will be reapplied to the pasture for its nutrient value.

Nutrient application means and methods are further discussed in Section 8 - Nutrient Management. However, the following criteria will be used in sizing both the settling and storage ponds for both the committed 699 herd size scenario, as well as at the contemplated herd size of 2,000 mature dairy cows:

7.2.1 Pond Operation and Sizing Criteria
Wastewater from the dairy facility, yards, and calf sheds is discharged into the settling pond first. Solids settle and accumulate at the bottom of this pond as liquid effluent collects over several days. A stirrer pump is operated two hours per day to break up the solids in the settling pond. Once the settling pond is full with both solids and liquid, any additional liquid effluent (minus settled solids) that enters the settling pond daily, overflows to the adjacent storage pond through screened overflow pipes (13,225.8 gpd for 699 mature dairy cows and 37,894.7 gpd for 2,000 mature dairy cows). The settling pond remains full in normal steady state until the solids are utilized on the pasture.

Accumulated solids in the settling pond will be pumped out as weather and paddock conditions permit (slurry application – discussed in Section 8.4 Nutrient Application), but at a minimum of once every 45 days (will be emptied with no more than 45 days’ worth of accumulated solids). An appropriate mixing volume of liquid is required for stirring the solids into a slurry suspension, for pumping to the pasture.
The storage pond will be emptied according to a 4-day application schedule (i.e. planned every 4 days). The effluent will be applied only when there has been no significant rain in the last two days and no significant heavy rain is forecasted for the next two days.

While the settling pond typically remains full, the level of the storage pond will rise slightly during each milking wash down, when the daily amount of manure and effluent from the dairy facility will enter the storage pond, and will lower on irrigation days when the pond is emptied.

On irrigation days, liquid effluent from the storage pond is applied onto the pastures after being diluted and injected into the irrigation water stream through the center pivots. The daily amount of effluent added to the storage pond (13,225.8 gpd for 699 mature dairy cows and 37,894.7 gpd for 2,000 mature dairy cows) is only a small fraction of the upward estimate of a potential daily irrigation application of 2.26 MGD. This daily amount is still only a small fraction of irrigation even during the winter months, where the daily irrigation demand is at its lowest at 839,474 gpd (in the month of December). As such, effluent pumped to the center pivots is diluted and applied to the pasture at an application rate significantly less than the nutrient requirement of the grass (See Section 8.4 Nutrient Application).

The minimum required effluent volume in both ponds shall also include the additional storage required during periods of heavy, sustained rainfall when irrigation application of effluent or slurry application of solids is not possible. The design effluent period includes allowances for the following volumes:

- Effluent volume for 4-day period between scheduled irrigation of effluent
- Effluent volume for maximum 17 consecutive rain days based on NOAA rain gauge data, See Table 3 - NOAA Rain Gauge Data
- Effluent volume for 2 day period prior to forecasted heavy rain
- Effluent volume for 2 day period for minimum of pasture dry time after heavy rain

Based on the above volumes, the minimum effluent volume provided should include 25 days of effluent volume. The design volume required will be set to 30 days of effluent, which will provide an additional capacity buffer.
The ponds have the capacity for the following volumes:

- Volume of manure, wastewater, and other wastes accumulated during the period between effluent irrigation application
- Volume of accumulated solids during the period between the maximum time allowed for slurry application
- Depth of the 25-year, 24-hour storm precipitation
- Depth of highest monthly average precipitation for the 30-day design volume period

The pond volume calculations are based on the following assumptions:

**Table 17 – Effluent Pond Sizing Criteria**

<table>
<thead>
<tr>
<th>Design Criteria/Assumption</th>
<th>699 Mature Dairy Cows</th>
<th>2,000 Mature Dairy Cows</th>
<th>Pond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Wastewater Generation</td>
<td>13,225.8 gpd</td>
<td>37,894.7 gpd</td>
<td></td>
</tr>
<tr>
<td>Percentage of Solids</td>
<td>1%</td>
<td>1%</td>
<td>Settling</td>
</tr>
<tr>
<td>Volume of Accumulated Solids for 45-day Period</td>
<td>5,951.6 gal</td>
<td>17,052.6 gal</td>
<td>Settling</td>
</tr>
<tr>
<td>Volume of Accumulated Solids for 45-day Period</td>
<td>5,951.6 gal</td>
<td>17,052.6 gal</td>
<td>Settling</td>
</tr>
<tr>
<td>Daily Flow to Storage Pond</td>
<td>13,225.8 gpd</td>
<td>37,894.7 gpd</td>
<td></td>
</tr>
<tr>
<td>Minimum Volume of Effluent for 30-day Period</td>
<td>396,774 gal</td>
<td>1,136,841 gal</td>
<td>Storage</td>
</tr>
<tr>
<td>Depth of 25-Year, 24 Hour Storm</td>
<td>10.4 inches</td>
<td>10.4 inches</td>
<td>Storage</td>
</tr>
<tr>
<td>Depth of Normal Precipitation for 30-day Period</td>
<td>6 inches</td>
<td>6 inches</td>
<td>Storage</td>
</tr>
</tbody>
</table>

The effluent ponds and concrete holding areas are not covered. All rainfall in these areas is collected and conveyed to the ponds. Approximately 1.76 acres of area at the dairy facility drain to the ponds and are accommodated in the pond sizing and minimum volume requirements including runoff from the calf sheds and concrete gutter, the uncovered holding pens and yards, the uncovered loading areas, and the settling and storage pond areas. Rainfall collected from the roofs of the milking parlor and implement shed is discharged directly to grassed/landscaped areas adjacent to the buildings, and does not enter the effluent system.
Evaporation from the water surface of the ponds is likely to occur, as the ponds are not covered. However, for the purposes of sizing the effluent ponds, evaporation is not taken into account. The volume of evaporation during the 30-day design period adds to the ponds’ available holding capacity.

7.2.2 Settling Pond Size
As previously mentioned, the settling pond is sized to include the volume of accumulated solids for a maximum of 45 days, based on the maximum period between solids application.

In addition to the solids volume, a mixing volume will be provided within the settling pond, to allow for the stirring and suspension of solids when slurry application to the pastures is initiated. The minimum mixing volume is dependent on type of equipment, operational needs and operator preferences. For the settling pond, the mixing volume in the pond will be 362,020 gallons for the 699 mature dairy cow herd size, or 350,919 gallons for the contemplated 2,000 herd size. Additional mixing water can be injected, as needed, when applying the slurry.

The top of the settling pond is 87’ x 133’ with a total depth of 12’ from invert to overflow spillway. The settling pond total available volumes are shown in the figure below.

![Settling Pond - 699 Cow Facility](image)

**Figure 14A - Settling Pond Typical Section & Volumes for 699-cow Herd Scenario**
Figure 14B - Settling Pond Typical Section & Volumes for 2,000-cow Herd Scenario

See Section 8.4 – Effluent Application for additional information about the slurry application.

7.2.3 Storage Pond Size

When the settling pond fills completely with effluent over a period of several days following slurry application and lowering of the settling pond, liquid effluent then overflows through three 6-inch screened overflow pipes into the storage pond. The clear screens are fitted into the overflow pipes and do not allow solids to enter into the storage pond.

As previously mentioned, the volume of effluent storage within the storage pond is sized to allow for a minimum of 30 days of design volume storage for the contemplated herd size of up to 2,000 milking cows based upon a conservative evaluation of the irrigation schedule and rainfall data.

The top of the storage pond is 215’ x 133’ with a total depth of 16’. The storage pond total available volumes are shown in the figure below.
Nutrient Balance Analysis
May 24, 2016

Storage Pond - 699 Cow Facility

- Top of Berm
- Emergency Overflow
- Freeboard (1.0 ft.)
- Spare Volume
- Overflow Spillway from Setting Pond
- 3-6” Overflow Pipes from Storage Pond
- Volume of runoff from the 25-year, 24-hour storm event (P = 10.4”) on the pond surface and milking facility.
- Volume of normal runoff accumulated during the storage period (P = 6.0”) on the surface and milking facility.
- Volume of effluent accumulated during the storage period. (Storage = 30 days)

<table>
<thead>
<tr>
<th>699 Cow Facility Minimum Volumes (in gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top of Berm</td>
</tr>
<tr>
<td>Emergency Overflow</td>
</tr>
<tr>
<td>Freeboard (1.0 ft.)</td>
</tr>
<tr>
<td>Spare Volume</td>
</tr>
<tr>
<td>Overflow Spillway from Setting Pond</td>
</tr>
<tr>
<td>3-6” Overflow Pipes from Storage Pond</td>
</tr>
<tr>
<td>Volume of runoff from the 25-year, 24-hour storm event (P = 10.4”) on the pond surface and milking facility.</td>
</tr>
<tr>
<td>Volume of normal runoff accumulated during the storage period (P = 6.0”) on the surface and milking facility.</td>
</tr>
<tr>
<td>Volume of effluent accumulated during the storage period. (Storage = 30 days)</td>
</tr>
<tr>
<td>Total Minimum Required Volume</td>
</tr>
<tr>
<td>1,179,847</td>
</tr>
<tr>
<td>Total Available Volume</td>
</tr>
<tr>
<td>2,135,673</td>
</tr>
</tbody>
</table>

Figure 15A - Storage Pond Typical Section & Volumes for 699-cow Herd Scenario

Storage Pond - 2,000 Cow Facility

- Top of Berm
- Emergency Overflow
- Freeboard (1.0 ft.)
- Spare Volume
- Overflow Spillway from Setting Pond
- 3-6” Overflow Pipes from Storage Pond
- Volume of runoff from the 25-year, 24-hour storm event (P = 10.4”) on the pond surface and milking facility.
- Volume of normal runoff accumulated during the storage period (P = 6.0”) on the surface and milking facility.
- Volume of effluent accumulated during the storage period. (Storage = 30 days)

<table>
<thead>
<tr>
<th>2,000 Cow Facility Minimum Volumes (in gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top of Berm</td>
</tr>
<tr>
<td>Emergency Overflow</td>
</tr>
<tr>
<td>Freeboard (1.0 ft.)</td>
</tr>
<tr>
<td>Spare Volume</td>
</tr>
<tr>
<td>Overflow Spillway from Setting Pond</td>
</tr>
<tr>
<td>3-6” Overflow Pipes from Storage Pond</td>
</tr>
<tr>
<td>Volume of runoff from the 25-year, 24-hour storm event (P = 10.4”) on the pond surface and milking facility.</td>
</tr>
<tr>
<td>Volume of normal runoff accumulated during the storage period (P = 6.0”) on the surface and milking facility.</td>
</tr>
<tr>
<td>Volume of effluent accumulated during the storage period. (Storage = 30 days)</td>
</tr>
<tr>
<td>Total Minimum Required Volume</td>
</tr>
<tr>
<td>1,919,914</td>
</tr>
<tr>
<td>Total Available Volume</td>
</tr>
<tr>
<td>2,135,673</td>
</tr>
</tbody>
</table>

Figure 15B - Storage Pond Typical Section & Volumes for 2,000-cow Herd Scenario
The storage pond design incorporates an emergency spillway to direct overflow in case of a cataclysmic event. In normal operation, the storage pond provides additional spare volume at the top of the pond. In the 699-cow scenario, the spare volume is an additional 45% of the total volume required. In the 2,000-cow scenario, the spare volume represents an additional buffer of up to 12%. These spare volumes provide even greater buffer above the design capacity which includes storage for the required 25-year, 24 hour storm event, as well as volumes for 30 days of storage and normal precipitation on the adjacent areas which will drain to the ponds.

### 7.2.4 Effluent Pond Design

Ponds will have a bottom elevation that is a minimum of 2-feet above the seasonal high water table. Excavated side slopes will not be steeper than 2 horizontal to 1 vertical. An inlet pipe with a minimum diameter of 8 inches will be used for milking parlor waste for discharge into the settling pond. The pipe terminates a sufficient distance from the shoreline of the pond to ensure good distribution. A cleanout is also provided for removing obstructions. Three (3) 6-inch diameter pipes will be used for daily overflow from the settling pond into the storage pond.

The minimum elevation of the top of the settled embankment shall be 1 foot above the pond’s required volume. The combined side slopes of the settled embankment shall not be less than 5 horizontal to 1 vertical, and neither slope shall be steeper than 2 horizontal to 1 vertical unless provisions are made to provide stability. Embankments and disturbed areas surrounding the pond are treated to control erosion. This includes the inside slopes of the pond as needed to protect the integrity of the liner.

Pond lining will be installed to prevent seepage of wastewater from the waste impoundment structure for water conservation and environmental protection. All inlets, outlets, ramps, and other appurtenances will be installed in a manner that does not damage or impair the proper operation of the liner.

The pond perimeter will be fenced and warning signs posted to prevent people from using the area for activities other than its intended purpose. A marker or water level measuring device will be installed in the pond to indicate the stored volume and/or storage capacity remaining.
7.2.5 Emergency Spillway and Secondary Berm

The storage pond will have an emergency overflow spillway that will allow discharge from the pond in the event of a cataclysmic emergency such as a rainfall event greater than the 25-year,
Nutrient Balance Analysis
May 24, 2016

24-hour storm or other natural disaster. A secondary berm will also be constructed downhill of the effluent ponds before the existing drainage way and access / farm road, to contain an emergency discharge from the pond from the overflow spillway. Although not required by the guidelines, this secondary containment area will provide additional containment that will be roughly equivalent to 30 days of total liquid effluent volume collected over the 30-day storage period, or 1,136,841 gallons of additional emergency storage.
Nutrient Balance Analysis
May 24, 2016

8.0 Nutrient Management

HDF has committed to establishing the dairy with up to 699 mature dairy cows and associated calves. This size of operation does not require a Concentrated Animal Feeding Operation (CAFO) permit to be issued prior to operation.

Following establishment of the initial herd of 699 mature dairy cows, HDF is contemplating expansion of the herd to up to 2,000 mature dairy cows and associated calves. This size of operation will require a Concentrated Animal Feeding Operation (CAFO) permit to be issued prior to exceeding 699 mature dairy cows. Previous Environmental Protection Agency (EPA) regulations based the definition of CAFO’s on the number of “animal units” confined. EPA no longer uses the term “animal unit,” but instead refers to the actual number of mature dairy animals at the operation to define a CAFO. Additionally, though the cows are grazing in the paddocks and pasture and are not “confined”, the EPA still permits a CAFO based on the number of “animal units”.

From a nutrient management perspective, a dairy operation must also account for the calves that will be born on site. For the initial herd, there will be approximately 150 calves on the HDF site at any one time. At full operation as part of a contemplated herd expansion of up to 2,000 mature dairy cows, there will be approximately 500 calves at any one time. Some calves will be housed in the calving sheds, while others will be on the pasture grazing, depending on their age, size and health. Once the calf reaches 165 lbs or is 90 days old, they will be transferred to an off-site heifer raising facility. Nutrient management data and calculations hereon are presented for both the initial herd size and contemplated herd expansion.

8.1 Historical Background

The historical use of the land has been for sugar cane production terminated in the late 1990s, and after that time, for a beef cattle operation. The historical uses of the farm have left the soils depleted of the essential nutrients required for crop growth. A well-managed, pasture-based, rotational-grazing dairy focused on the application of nutrients will be a benefit to the existing soil structure and composition.
8.2 HDF Pasture-Based Dairy Background

The proposed HDF is a pasture-based system where cows are divided and managed in a series of fenced paddocks for rotational grazing. Through internal herd growth and the purchase of additional young stock when needed, the dairy herd is planned to consist of 699 head of mature dairy cows and approximately 150 calves at the initial operation, and may be expanded to up to 2,000 head of mature dairy cows and approximately 500 dairy calves at full operation. Although, at full production, a 2,000 mature dairy cow stocking density is contemplated, the number of cows will ultimately be decided by the land that is supporting the pasture-based system. The 469.9 acre pasture has been and will continue to be planted with Kikuyu grass that will serve as the base diet for the grazing animals.

The mature dairy cows will be managed in small groups (initially 105 – 115 cow mobs, but up to 300-330 cow mobs at the contemplated herd size) and are milked twice a day (1 hour per milking). Only one mob can be held in the milking facility at any one time. Manure deposited within the dairy facility will be collected and stored into a two stage manure storage system located to the south of the milking parlor. The manure storage is connected to two GPS enabled center pivot irrigation circles as well as a hard hose reel irrigation application system for the areas outside of the center pivots.

The farm is managed under a Conservation Plan developed with Natural Resource Conservation District (NRCS) guidance, and approved by the West Kaua‘i Soil and Water Conservation District. The Conservation Plan specifies a variety of agricultural best management practices (BMPs) to be installed and implemented, as appropriate, prior to farm population and operation of the dairy. Each BMP follows the current specifications for the Pacific Islands conservation practice standards. Each of these BMPs is designed to minimize agricultural impacts to waters of the State of Hawai‘i.

8.3 Nutrient Balance

Managing the amount, source, placement, and timing of plant nutrients and soil amendments is critical for the nutrient balance of the farm, and is the purpose of the Nutrient Management
Nutrient Balance Analysis  
May 24, 2016

Plan (NMP), which is prepared under technical guidance from the NRCS for nutrient management on the farm. A NMP, submitted for 699 mature dairy cows in July 2014 and titled “Waste Management Plan for Hawaii Dairy Farms”, has been reviewed by DOH, while an updated NMP for up to 2,000 mature dairy cows, will be prepared for review by DOH for the larger herd size, should the herd size increase past 699 mature dairy cows.

This type of planning minimizes the agricultural impacts to surface water and groundwater by properly utilizing manure and commercial fertilizers in balance with plant nutrient requirements. By following the Natural Resource Conservation Service Nutrient Management Standard (590), HDF will optimize nutrient applications through proper timing, placement, utilization, and monitoring of nutrients. NMPs typically include the following components:

- An inventory of nutrient sources on the farm, including manure and crop residues.
- Nutrient analyses of each nutrient source.
- A budget to supply and conserve nutrients for plant production.
- Soil tests to determine the nutrient needs of the crops to be grown.
- Procedures for when and how to apply the manure to maximize crop benefit and minimize the environmental impacts of the nutrients.
- Best Management Practices that minimize the potential for nutrient loss from the fields.
- Best Management Practices that minimize agricultural impacts to surface and groundwater resources.
- Procedures to monitor and maintain or improve the physical, chemical, and biological condition of the soil.

One of the most important considerations in nutrient management planning for farms is the understanding that the NMP is an adaptive management tool. Some even describe it as a living, breathing document that is constantly monitored and updated as the conditions of the farm evolve. The results from annual soil testing, manure testing, and forage testing will be used to update and inform the nutrient management process for HDF as the farm becomes established and operations mature.
8.3.1 NMP Basis of Design
The first year of the Nutrient Management Plan will be based off of a combination of available field data and theoretical modelling in order to come up with the proper nutrient application rates and timing. In year one of the plan, a nutrient mass balance will be performed to balance application rates. The variation of nutrient application will be based upon localized weather events and other management factors. Once manure has been excreted, captured and stored, a site specific manure analysis will be taken and analyzed.

8.3.2 Data Acquisition
Through the utilization of on-site grass data gathered by HDF, and the Cornell Net Carbohydrate Protein System (CNCPS) model, an estimate of the grass productivity, farm carrying capacity, milk production and manure excretion has been calculated, respectively.

8.3.3 Manure Excrete Models
The CNCPS model was used to determine and model the metabolizable energy (ME) and metabolizable protein (MP) requirements generated from varying levels of neutral detergent fiber intake (NDFi) and complementary grain given at milking time. After accounting for daily maintenance requirements, grass and grain analytics, and dry matter intake (DMI), the expected milk production and manure excretion can be calculated. This analysis was performed by Robert C. Fry, DVM, a dairy nutritionist with Atlantic Dairy Consulting.

Estimates of manure volume and nutrient quantity, calculated by CNCPS, were compared against the USDA/NRCS Agricultural Waste Management Field Handbook (March 2008), along with the USDA/NRCS Ag Waste Management Software Program. The field handbook utilizes established American Society of Agricultural Engineers (ASAE) values. The calculated and estimated values from the CNCPS Model will be replaced with actual site specific data once HDF is in operation and site specific manure analysis can be conducted.

8.3.4 Manure Model Analysis and Outputs
The CNCPS model was also utilized to calculate manure production per cow per day. CNCPS was also utilized to forecast the nutrient concentration of the as excreted manure collected at the dairy facility, slurry, and stored lagoon effluent that will be applied through irrigation systems. Total collected manure includes parlor wash down water, rain water deposited on the holding
area and within the manure storage system, and manure produced during the two hours of milking per day as well as the manure produced in the calf sheds. The CNCPS Model Manure Production = 90.8 lbs per cow per day. ASAE D384.2 MAR2005 publication from the American Society of Agricultural Engineers was utilized to estimate the calf manure production and associated nutrient content. ASAE Calf Manure Production = 19 lbs per calf per day.

Based upon the CNCPS Model, the following nutrient characteristics for the as-excreted manure of both mature dairy cows and calves are shown below:

**Table 18A: Nutrient Characteristics of Manure for a Mature Dairy Cow**

<table>
<thead>
<tr>
<th>Animal Nitrogen Excretion</th>
<th>0.546</th>
<th>Lbs-N / Cow / Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal Phosphorus Excretion</td>
<td>0.11</td>
<td>Lbs-P / Cow / Day</td>
</tr>
</tbody>
</table>

**Table 18B: Nutrient Characteristics of Manure for a Calf**

<table>
<thead>
<tr>
<th>Animal Nitrogen Excretion</th>
<th>0.140</th>
<th>Lbs-N / Calf / Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal Phosphorus Excretion</td>
<td>0.044</td>
<td>Lbs-P / Calf / Day</td>
</tr>
</tbody>
</table>

Based upon the milking process and parlor design, the estimated waste generation within the various locations and processes on the farm from both the mature dairy cows and calves are shown below:

**Table 19A: Estimated Waste Generation of a Mature Dairy Cow**

<table>
<thead>
<tr>
<th>Manure Production</th>
<th>90.8</th>
<th>Lbs/Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cow Waking Hours</td>
<td>16</td>
<td>Hours</td>
</tr>
<tr>
<td>Cows in Parlor</td>
<td>2</td>
<td>Hours</td>
</tr>
<tr>
<td>Manure Production in Parlor</td>
<td>1.361</td>
<td>Gal / Cow / Day</td>
</tr>
<tr>
<td>Cows at Pasture</td>
<td>14</td>
<td>Hours</td>
</tr>
<tr>
<td>Manure Production in Pasture</td>
<td>9.52</td>
<td>Gal / Cow / Day</td>
</tr>
<tr>
<td>Parlor Wash Water</td>
<td>17.40</td>
<td>Gal / Cow / Day</td>
</tr>
</tbody>
</table>
Table 19B: Estimated Waste Generation of a Calf

<table>
<thead>
<tr>
<th>Manure Production</th>
<th>19</th>
<th>Lbs/Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manure Production in Pasture or</td>
<td>2.244</td>
<td>Gal / Cow / Day</td>
</tr>
<tr>
<td>Manure Production in Calf Shed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ASAE American Society of Agricultural Engineers referenced for calf manure production.

Based upon the size of the effluent ponds and holding areas, additional normal rainfall and captured runoff must be accounted for. The sizes of the ponds are input as shown below:

Table 20: Areas Used to Determine Rainfall and Captured Runoff Input

<table>
<thead>
<tr>
<th>Storage Pond #1 (Settling Pond)</th>
<th>Length</th>
<th>Width</th>
<th>Top Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>132</td>
<td>85.5</td>
<td>11,286</td>
</tr>
<tr>
<td></td>
<td>Feet</td>
<td>Feet</td>
<td>Square feet</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Storage Pond #2 (Storage Pond)</th>
<th>Length</th>
<th>Width</th>
<th>Top Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>212</td>
<td>132</td>
<td>27,984</td>
</tr>
<tr>
<td></td>
<td>Feet</td>
<td>Feet</td>
<td>Square feet</td>
</tr>
</tbody>
</table>

| Holding Area                          | 6,795  | Square feet |

Based upon these parameters, the amounts of monthly effluent generation collected within the effluent ponds serving the dairy facility are calculated below for the 699 mature dairy cow scenario and the 2,000 mature dairy cow scenario. These numbers are critical in validating the size of the effluent ponds, as well as tracking the overall movement, collection, and distribution of nutrients through the farms systems, from grass uptake to as-excreted manure in the facility, to collection in the effluent ponds, and ultimate redistribution and nutrient for grass growth.
Table 21A: Estimated Monthly Effluent Generation Collected in Manure Storage System (Operational) for 699 Mature Dairy Cows and 50 Calves in Pens

<table>
<thead>
<tr>
<th>Month</th>
<th>Days per Month (days /mo)</th>
<th>Manure Collected in Parlor and Calf Pens (gal/mo)</th>
<th>Wash Water Collected in Parlor (gal/mo)</th>
<th>Average Month Rainfall – P (in.)</th>
<th>Average Month Pan Evaporation – Ea (in.)</th>
<th>Average Monthly Net Manure Storage – Em (50% of pan) (in.)</th>
<th>Average Monthly Net Rainfall Directly on Manure Storage (P – Em) (in.)</th>
<th>Average Monthly Net Rainfall of Holding Area (gal/mo)</th>
<th>Total Effluent (rainfall + wastewater) Collected (gal/mo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>31</td>
<td>32,960</td>
<td>377,041</td>
<td>4.88</td>
<td>5.14</td>
<td>2.57</td>
<td>2.31</td>
<td>56,545</td>
<td>20,669</td>
</tr>
<tr>
<td>February</td>
<td>28</td>
<td>29,770</td>
<td>340,553</td>
<td>4.20</td>
<td>5.65</td>
<td>2.83</td>
<td>1.38</td>
<td>33,658</td>
<td>17,789</td>
</tr>
<tr>
<td>March</td>
<td>31</td>
<td>32,960</td>
<td>377,041</td>
<td>5.04</td>
<td>6.93</td>
<td>3.47</td>
<td>1.58</td>
<td>38,553</td>
<td>21,347</td>
</tr>
<tr>
<td>April</td>
<td>30</td>
<td>31,897</td>
<td>364,878</td>
<td>3.66</td>
<td>7.43</td>
<td>3.72</td>
<td>-0.05</td>
<td>-1,346</td>
<td>15,502</td>
</tr>
<tr>
<td>May</td>
<td>31</td>
<td>32,960</td>
<td>377,041</td>
<td>3.05</td>
<td>7.82</td>
<td>3.91</td>
<td>-0.86</td>
<td>-21,051</td>
<td>12,918</td>
</tr>
<tr>
<td>June</td>
<td>30</td>
<td>31,897</td>
<td>364,878</td>
<td>2.86</td>
<td>8.05</td>
<td>4.03</td>
<td>-1.17</td>
<td>-28,517</td>
<td>12,114</td>
</tr>
<tr>
<td>July</td>
<td>31</td>
<td>32,960</td>
<td>377,041</td>
<td>3.13</td>
<td>9.10</td>
<td>4.55</td>
<td>-1.42</td>
<td>-34,759</td>
<td>13,257</td>
</tr>
<tr>
<td>August</td>
<td>31</td>
<td>32,960</td>
<td>377,041</td>
<td>3.20</td>
<td>9.37</td>
<td>4.69</td>
<td>-1.49</td>
<td>-36,350</td>
<td>13,554</td>
</tr>
<tr>
<td>September</td>
<td>30</td>
<td>31,897</td>
<td>364,878</td>
<td>3.25</td>
<td>8.23</td>
<td>4.12</td>
<td>-0.87</td>
<td>-21,174</td>
<td>13,766</td>
</tr>
<tr>
<td>October</td>
<td>31</td>
<td>32,960</td>
<td>377,041</td>
<td>4.96</td>
<td>7.33</td>
<td>3.67</td>
<td>1.30</td>
<td>31,699</td>
<td>21,008</td>
</tr>
<tr>
<td>November</td>
<td>30</td>
<td>31,897</td>
<td>364,878</td>
<td>6.01</td>
<td>6.17</td>
<td>3.09</td>
<td>2.93</td>
<td>71,599</td>
<td>25,456</td>
</tr>
<tr>
<td>December</td>
<td>31</td>
<td>32,960</td>
<td>377,041</td>
<td>5.71</td>
<td>5.40</td>
<td>2.70</td>
<td>3.01</td>
<td>73,680</td>
<td>24,185</td>
</tr>
<tr>
<td>Annual Total</td>
<td>365</td>
<td>388,076</td>
<td>4,439,349</td>
<td>49.95</td>
<td>86.62</td>
<td>43.31</td>
<td>6.64</td>
<td>162,536</td>
<td>211,566</td>
</tr>
</tbody>
</table>

* Manure estimates provided by Cornell Net Carbohydrate Protein System model for the Mature Dairy Cow and American Society of Agricultural Engineers ASAE D384.2 MAR2005 for Dairy Calves.
** Rainfall data provided by University of Hawai‘i Rainfall Atlas of Hawai‘i (2011).
*** Pan evaporation data provided by State of Hawai‘i DLNR Pan Evaporation Report R74 dated August 1985 for station Māhā‘ulepū 940.00.
Table 21B: Estimated Monthly Effluent Generation Collected in Manure Storage System (Operational) for 2,000 Mature Dairy Cows and 167 Calves in Pen

<table>
<thead>
<tr>
<th>Month</th>
<th>Days per Month (days/mo)</th>
<th>Manure Collected in Parlor and Calf Pens (gal/mo)</th>
<th>Wash Water Collected in Parlor (gal/mo)</th>
<th>Average Month Rainfall – P (in.)</th>
<th>Average Month Pan Evaporation – Ea (in.)</th>
<th>Average Monthly Net Rainfall Directly on Manure Storage (P – Em) (in.)</th>
<th>Average Monthly Net Rainfall on Pond Area (gal/mo)</th>
<th>Average Monthly Net Rainfall of Holding Area (gal/mo)</th>
<th>Total Effluent (rainfall + wastewater) Collected (gal/mo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>31</td>
<td>95,971</td>
<td>1,078,800</td>
<td>4.88</td>
<td>5.14</td>
<td>2.57</td>
<td>2.31</td>
<td>56,545</td>
<td>20,669</td>
</tr>
<tr>
<td>February</td>
<td>28</td>
<td>86,683</td>
<td>974,400</td>
<td>4.20</td>
<td>5.65</td>
<td>2.83</td>
<td>1.38</td>
<td>33,658</td>
<td>17,789</td>
</tr>
<tr>
<td>March</td>
<td>31</td>
<td>95,971</td>
<td>1,078,800</td>
<td>5.04</td>
<td>6.93</td>
<td>3.47</td>
<td>1.58</td>
<td>38,553</td>
<td>21,347</td>
</tr>
<tr>
<td>April</td>
<td>30</td>
<td>92,875</td>
<td>1,044,000</td>
<td>3.66</td>
<td>7.43</td>
<td>3.72</td>
<td>-0.05</td>
<td>-1,346</td>
<td>15,502</td>
</tr>
<tr>
<td>May</td>
<td>31</td>
<td>95,971</td>
<td>1,078,800</td>
<td>3.05</td>
<td>7.82</td>
<td>3.91</td>
<td>-0.86</td>
<td>-21,051</td>
<td>12,918</td>
</tr>
<tr>
<td>June</td>
<td>30</td>
<td>92,875</td>
<td>1,044,000</td>
<td>2.86</td>
<td>8.05</td>
<td>4.03</td>
<td>-1.17</td>
<td>-28,517</td>
<td>12,114</td>
</tr>
<tr>
<td>July</td>
<td>31</td>
<td>95,971</td>
<td>1,078,800</td>
<td>3.13</td>
<td>9.10</td>
<td>4.55</td>
<td>-1.42</td>
<td>-34,759</td>
<td>13,257</td>
</tr>
<tr>
<td>August</td>
<td>31</td>
<td>95,971</td>
<td>1,078,800</td>
<td>3.20</td>
<td>9.37</td>
<td>4.69</td>
<td>-1.49</td>
<td>-36,350</td>
<td>13,554</td>
</tr>
<tr>
<td>September</td>
<td>30</td>
<td>92,875</td>
<td>1,044,000</td>
<td>3.25</td>
<td>8.23</td>
<td>4.12</td>
<td>-0.87</td>
<td>-21,174</td>
<td>13,766</td>
</tr>
<tr>
<td>October</td>
<td>31</td>
<td>95,971</td>
<td>1,078,800</td>
<td>4.96</td>
<td>7.33</td>
<td>3.67</td>
<td>1.30</td>
<td>31,699</td>
<td>21,008</td>
</tr>
<tr>
<td>November</td>
<td>30</td>
<td>92,875</td>
<td>1,044,000</td>
<td>6.01</td>
<td>6.17</td>
<td>3.09</td>
<td>2.93</td>
<td>71,599</td>
<td>25,456</td>
</tr>
<tr>
<td>December</td>
<td>31</td>
<td>95,971</td>
<td>1,078,800</td>
<td>5.71</td>
<td>5.40</td>
<td>2.70</td>
<td>3.01</td>
<td>73,680</td>
<td>24,185</td>
</tr>
<tr>
<td>Annual Total</td>
<td>365</td>
<td>1,129,981</td>
<td>12,702,000</td>
<td>49.95</td>
<td>86.62</td>
<td>43.31</td>
<td>6.64</td>
<td>162,536</td>
<td>211,566</td>
</tr>
</tbody>
</table>

* Manure estimates provided by Cornell Net Carbohydrate Protein System model for the Mature Dairy Cow and American Society of Agricultural Engineers ASAE D384.2 MAR2005 for Dairy Calves.
** Rainfall data provided by University of Hawai‘i Rainfall Atlas of Hawai‘i (2011).
*** Pan evaporation data provided by State of Hawai‘i DLNR Pan Evaporation Report R74 dated August 1985 for station Māhāʻulepū 940.00.
8.3.5 Grass Yields

The pasture-based system enables the mature dairy cows to spend 22 hours (16 waking hours) in the paddocks, where a corresponding proportion of their excreted manure will be discharged directly onto the paddocks. The dominant grass is Kikuyu; (*Pennisetum clandestinum*) a high yielding species, that (when properly fertilized) can yield more than 20 tons (U.S.) per acre. This grass is more adapted to warm or hot seasonal conditions under moist or dry environments and is known to produce more than 35 tons of dry matter per acre per year.

The Kikuyu is extremely effective in the tropics and adds significant protection to soils in terms of creating a tight organic thatch. As the cattle excrete on the Kikuyu thatch, it is incorporated into what is effectively an organic net. Due to the high moisture and moderate temperatures, the microbial activity in the thatch is very high and the effluent will be largely broken down by microbial activity within 24 hours.

The Kikuyu thatch will also reduce runoff during heavy rain events by holding water in its dense but also porous structure. Preventing and reducing runoff will keep nutrients within the paddocks and soils on the farm for uptake by the grass, where effluent can be broken down quickly as noted above. Additionally, grass yields are directly related to soil compaction, whether through hoof compaction of soils or disturbance in the soil structure caused by machine cultivation. Once the Kikuyu thatch is established, the soil itself is not disturbed by cultivation; the thatch will be exposed to grazing pressure.

The grass will need significant additional nutrient application with conventional fertilizers for the initial herd size of 699 mature dairy cows. The grass will also need some, but less, additional nutrient application with commercial fertilizer at the contemplated herd size of up to 2,000 cows. Nutrient mass balance scenarios for both herd sizes are discussed in Section 8.3.9.
Nutrient Balance Analysis
May 24, 2016

The project has an estimated yield goal of 20 tons (U.S.) of dry matter production of Kikuyu per acre. Kikuyu yield ranges between 4 tons unfertilized and 20-plus tons of dry matter (DM)/acre/year depending on levels of N fertilization. Kikuyu’s response to fertilization is very good and linear, and combined with irrigation, anticipated growth rates in Māhā'ulepū are estimated to be some of the best in the world. The average local temperature is in the ideal 60°F and 104°F range for Kikuyu pastures.

Although the goal is for a 20-ton Kikuyu yield for mature pasture grass, actual yield data, based on 15 months of growth trials on 70 acres of pasture on the farm is available, and is the basis for all nutrient application rates. The Kikuyu grass trials have averaged 16.3 tons of Dry Matter (DM) / acre / year. Calculations provided hereon will utilize a grass production of 16.3 tons of DM / acre / year, although after several years of pasture maturation and establishment, yields closer to or exceeding 20 tons of DM / acre / year are realistic. The more grass that is grown allows more cows to be sustained on the farm as grass provides the majority of their feed and also uptakes nearly all of their manure / effluent.

Based upon the grass growth trials on 70 acres of pasture on the farm, the nutrient uptake rates for Kikuyu in lbs of uptake per ton of Dry Matter (DM) are as follows:

**Lbs of Nitrogen (N) uptake per ton DM = 64 lbs. N**

**Lbs of Phosphorus (P) uptake per ton DM = 11.4 lbs. P**

**Lbs of Potassium (K) uptake per ton DM = 90 lbs. K**

HDF coordinated the collection of Kikuyu grass samples beginning September 2, 2014 and repeated sampling every fourth harvest after an 18-day rest period. The intent was to simulate the harvest of grass by cows grazing a paddock every 18 days. The trials were conducted in different locations on the farm for over a year.

Kikuyu grass samples were collected at 18 days of rest. The procedure for collection included random grab samples to replicate a cow grazing. Samples were collected every 5 steps while walking diagonally across the field. About 30 grabs were collected from each field and mixed to create a composite sample for the field. These samples were collected and dried at the same time as the production data samples and sent to Cumberland Valley Analytical services for wet chemistry and in vitro assay of forage quality.
8.3.6 Grass Nutrient Content

Cumberland Valley Analytic Services, certified by the National Forage Testing Association, performed wet chemistry analysis for Dry Matter, Crude Protein, Soluble Protein, Acid Detergent Fiber, Neutral Detergent Fiber, Ash, Calcium, Phosphorus, and in vitro NDF analysis as a method of assessing the nutritive value of the grass trial samples. NDF digestibility was reported at 30, 120, and 240 hour time points for the generation of rates and pools used in the CNCPS model.

8.3.7 Soils Analysis

The NRCS soils classifications and descriptions provide a good base layer of information to use for nutrient budgeting. However, additional soil testing is required to determine soil nutrient levels to be used in the nutrient budget analysis. Soil samples have been taken throughout the farm and have been analyzed for pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents.

The farm has approximately 469.9 acres in pasture, which is divided up into 119 total paddocks of about 3 to 5 acres in size. In 2014, soil sample grabs were taken at various locations on the farm and within the different paddocks, and then combined into one representative sample per paddock. The samples were tested by Spectrum Analytical, and soil fertility recommendations were then provided based off of baseline of soil chemical composition and content. This baseline data has been used to inform the nutrient balance of the farm by indicating the fertility requirement of the crop. Subsequent sampling will occur during operation to monitor nutrient levels in the soils so the nutrient budgets can be adjusted during operation.

In 2015, Dr. Russell Yost and Nicolas Krueger, of the University of Hawai’i-Mānoa – CTAHR, conducted additional soil sampling to provide additional baseline data of soil quality, nutrient, status, and health of the sections of the dairy with comparisons to different soil types. Soil cores were collected at sampling locations using a standard probe with locations identified by GPS. Samples were collected and analyzed, with resulting data plotted, mapped and interpreted. Composite samples were taken at approximately 50 locations with two depths for each sample (0-20cm and 20-40cm). The composites were comprised of three samples per composite sample. Saturated paste electrical conductivity was determined as well as exchangeable sodium percentage, calcium, magnesium, and potassium. Levels of nitrogen and phosphorus were also
assessed to establish the nutrient baseline. Refer to the “Hawai‘i Dairy Farms Baseline Nutrient Status: Implications for Long-Term Sustainability, Productivity, and Soil Health” report by Russell Yost & Nicholas Krueger, University of Hawai‘i-Mānoa – CTAHR.

8.3.8 Soils Risk Assessment Classification

Because the basis of design for the farm is pasture-based, rotational-grazing, and no significant amount of annual tillage planned, soil loss tolerance (T) is manageable in accordance with the NRCS Conservation Plan prepared by Hawai‘i Dairy Farms, and approved by the West Kaua‘i Soil and Water Conservation District in December 2013. Additional risk assessments for nitrogen and phosphorus leaching are indicated below:

**Nitrogen Leaching Index per Hawai‘i NRCS 590 Standard**

<table>
<thead>
<tr>
<th>Soil Hydrologic Group</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;100&quot;</td>
<td>H</td>
<td>H</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>50-100&quot;</td>
<td>H</td>
<td>M</td>
<td>M</td>
<td>L</td>
</tr>
<tr>
<td>&lt;50&quot;</td>
<td>M</td>
<td>M</td>
<td>L</td>
<td>L</td>
</tr>
</tbody>
</table>

Low – No additional mitigation required
Mod – Timing of nitrogen applications must be applied to coincide with crop growing season
High – Timing of nitrogen applications must coincide with crop growing season and be split applied to prevent leaching

The nitrogen leaching index was run on each soil type. Below are the results by soil type:

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Soil Hydrologic Group</th>
<th>Annual Rainfall</th>
<th>Nitrogen Leaching Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>HsD</td>
<td>B</td>
<td>&lt;50&quot;</td>
<td>Moderate</td>
</tr>
<tr>
<td>HiE</td>
<td>B</td>
<td>&lt;50&quot;</td>
<td>Moderate</td>
</tr>
<tr>
<td>KavB</td>
<td>C</td>
<td>&lt;50&quot;</td>
<td>Low</td>
</tr>
<tr>
<td>KavC</td>
<td>C</td>
<td>&lt;50&quot;</td>
<td>Low</td>
</tr>
<tr>
<td>KdF</td>
<td>C</td>
<td>&lt;50&quot;</td>
<td>Low</td>
</tr>
<tr>
<td>Ke</td>
<td>C</td>
<td>&lt;50&quot;</td>
<td>Low</td>
</tr>
<tr>
<td>KEHF</td>
<td>C</td>
<td>&lt;50&quot;</td>
<td>Low</td>
</tr>
<tr>
<td>LuB</td>
<td>C</td>
<td>&lt;50&quot;</td>
<td>Low</td>
</tr>
<tr>
<td>PdA</td>
<td>B</td>
<td>&lt;50&quot;</td>
<td>Moderate</td>
</tr>
<tr>
<td>PdC</td>
<td>B</td>
<td>&lt;50&quot;</td>
<td>Moderate</td>
</tr>
<tr>
<td>Ws</td>
<td>C</td>
<td>&lt;50&quot;</td>
<td>Low</td>
</tr>
</tbody>
</table>
The risk for leaching nitrogen is low to moderate in all locations of the farm, and nitrogen applications on areas with a moderate risk will be managed and timed to the crop growing season (Kikuyu growing season is year-round in Hawai‘i). Therefore, application of nitrogen could occur year-round in amounts appropriate to the soil type and crop growth.

**Phosphorus Index Interpretation per Hawai‘i NRCS 590 Standard:**

<table>
<thead>
<tr>
<th>Risk Assessment</th>
<th>Phosphorus Index Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>&lt;30</td>
</tr>
<tr>
<td>Mod</td>
<td>30-90</td>
</tr>
<tr>
<td>High</td>
<td>&gt;90</td>
</tr>
</tbody>
</table>

**Low** - phosphorus can be applied at rates greater than crop requirement not to exceed the nitrogen requirement for the succeeding crop if manure or other organic materials are used to supply nutrients.

**Mod** - phosphorus can be applied not to exceed the crop requirement rate.

**High** - phosphorus can be applied not to exceed the crop removal rate if the following requirements are met: A soil phosphorus drawdown strategy has been implemented, and an assessment for nutrients and soil loss has been conducted to determine if mitigation practices are required to protect water quality. Any deviation from these high risk requirements must have the approval of the Chief of the NRCS.

The phosphorus leaching index was run on each soil type. Below are the results by soil type:

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Phosphorus Index Value</th>
<th>Phosphorus Leaching Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>HsD</td>
<td>10-18</td>
<td>Low</td>
</tr>
<tr>
<td>HtE</td>
<td>10-18</td>
<td>Low</td>
</tr>
<tr>
<td>KavB</td>
<td>10-18</td>
<td>Low</td>
</tr>
<tr>
<td>KavC</td>
<td>10-18</td>
<td>Low</td>
</tr>
<tr>
<td>KdF</td>
<td>10-18</td>
<td>Low</td>
</tr>
<tr>
<td>Ke</td>
<td>10-18</td>
<td>Low</td>
</tr>
<tr>
<td>KEHF</td>
<td>10-18</td>
<td>Low</td>
</tr>
<tr>
<td>LuB</td>
<td>10-18</td>
<td>Low</td>
</tr>
<tr>
<td>PdA</td>
<td>10-18</td>
<td>Low</td>
</tr>
<tr>
<td>PdC</td>
<td>10-18</td>
<td>Low</td>
</tr>
<tr>
<td>Ws</td>
<td>10-18</td>
<td>Low</td>
</tr>
</tbody>
</table>
Nutrient Balance Analysis
May 24, 2016

The risk for leaching phosphorus is low in all locations of the farm and phosphorus could be applied at rates greater than the crop requirement not to exceed the nitrogen requirement for the succeeding crop, to maximize crop productivity and improve soil health. However, since the grass crop is not newly planted for each rotation and the growing season is constant and year-round, the phosphorus application is planned to be managed and adjusted to not exceed the crop requirement rate once the pasture has been established.

8.3.9 Nutrient Mass Balance
The annual net nutrient (nitrogen and phosphorus) demand for Kikuyu is summarized in the following tables. The crop nutrient needs will be satisfied by the application of effluent, manure, and supplemental commercial fertilizer. The commercial fertilizer need is expressed as a nutrient deficit of nitrogen and phosphorus based upon the 16.3 tons DM Kikuyu yields.

The following table may be updated as crop yields change, as the nutrient balance of the farm is a dynamic environmental analysis. As the yield of Kikuyu increases as expected, due to pasture maturation and establishment as well as nutrient management (to reach the yield goal of 20 tons DM per acre per year), the annual net nutrient demand of nitrogen and phosphorus will also increase, meaning either more manure (and more cows, up to 2,000) or more commercial fertilizer may be used to maintain a healthy pasture and soil nutrient balance. The pasture-based, rotational-grazing system must manage these different environmental variables.

It is important to note that even as nutrient demand increases as the crop yield improves and the pasture matures, nutrients (nitrogen and phosphorus) will not be applied at rates that exceed the recommendations of the leaching indexes interpretations shown in the NRCS 590 Standard above once the pasture has been established.

The nutrient mass balance approach for HDF assumes that 100% of the manure nutrients are 100% available at the time of application. This is a very conservative way of calculating nutrients that are available for crop uptake, and ultimately the stocking density and number of animals that can be supported on the pasture. Because of nitrogen dynamics, most nutrient management plans only account for 50% of the nitrogen to be plant available while the other 50% is lost to the environment through volatilization. This nutrient balance analysis does not take any volatilization into account. Plant nutrient uptake is also inefficient with respect to
phosphorus because of the extensive sorption and binding reactions of phosphorus with the soils at the HDF site, sharply reducing the amount that is plant available. This mass balance uses the full amount of manure nutrients applied to the fields, whether it is irrigated, applied as slurry, or is excreted by the cow directly onto the pasture, as available to the crop, in the management of the farm's nutrient cycle and to determine the overall stocking density. If volatilization or soil sorption were taken into account, more manure nutrients (and therefore more cows) could be used to maintain a healthy pasture and soil/crop nutrient balance.

While the nutrient deficits shown in the tables below represent the supplemental fertilizer required for the Kikuyu crop, they are not an exact accounting of the total amount of commercial nutrients that must be applied to maintain high forage productivity and soil health. Rather, these values only represent the net amount of nutrients that need to be provided to and utilized by the crop through commercial fertilization, beyond the nutrient that is available to the crop from manure sources. Fertilization, especially the application of commercial nitrogen, can be inefficient with actual requirements with respect to forage production, and fertilization needs can be as much as 25% to 50% greater than the arithmetical difference resulting from a mass balance calculation - due to volatilization or soil sorption as mentioned above. Refer to the previously mentioned soils report by Russell Yost & Nicholas Krueger, UH-Mānoa – CTAHR. It should be noted and planned that the commercial fertilization requirements to maintain high forage productivity and soil health can exceed the simple arithmetic difference between the nutrients applied by manure and the forage uptake.

While these two factors in nutrient availability may seem contrary to each other in nutrient management analyses, where it would appear that manure nutrients are 100% available to the crop but more commercial nutrients would be needed due to inefficiencies in fertilization, the manure nutrient application and availability are first and foremost, the primary factors in measuring the stocking density of the farm, as the manure is the primary source of nutrients for the kikuyu crop. The commercial nutrient application is only meant to provide the needed deficit of nutrients to the crop, beyond what is provided by the manure, to maintain high forage productivity and soil health. The inefficiencies of nutrient application from a mass balance perspective and from a commercial fertilization perspective do not have the same impacts on the pasture-based rotation grazing dairy system. By assuming 100% of manure nutrients are
available to the crop (though it is anticipated that nutrients are lost to volatilization of nitrogen and soil sorption of phosphorus), HDF is proposing a very conservative mass balance approach that reduces the stocking density of the farm. By understanding that commercial fertilizers are inefficient due to these same dynamics, HDF is realistic in its commercial fertilizer expectations and what is needed to provide the remaining nutrients to the crop that it does not get from manure sources.

HDF will utilize a proven, pasture-based, rotation grazing dairy system with high productive forage grasses. These grasses, with fibrous root systems, are typically among the most efficient plants in using applied nutrients (whether through manure or commercial fertilizer) and studies have shown that application of effluents generated from dairy operations via irrigation systems is an effective means of both managing the effluent while simultaneously providing nutrients needed by these productive tropical grasses. Still, HDF must be diligent and balance its planned applications of manure, effluent, slurry, and commercial fertilizer to ensure environmental sustainability and protection.
Table 22A: Hawaiʻi Dairy Farms Nutrient Mass Balance for 699 Mature Dairy Cows and 150 calves in Pens and Pasture

<table>
<thead>
<tr>
<th>Month</th>
<th>( \text{N Collected in Pond (lbs-N/mo)} )</th>
<th>( \text{P Collected in Pond (lbs-P/mo)} )</th>
<th>( \text{N Excreted on Pasture (lbs-N/mo)} )</th>
<th>( \text{P Excreted on Pasture (lbs-P/mo)} )</th>
<th>( \text{N Total Deposited on Farm (lbs-N/mo)} )</th>
<th>( \text{P Total Deposited on Farm (lbs-P/mo)} )</th>
<th>( \text{N Total Uptake from Farm (lbs-N/mo)} )</th>
<th>( \text{P Total Uptake from Farm (lbs-P/mo)} )</th>
<th>( \text{N Deficit (lbs-N/mo) (Fertilizer Need)} )</th>
<th>( \text{P Deficit (lbs-P/mo) (Fertilizer Need)} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>1,696</td>
<td>366</td>
<td>11,003</td>
<td>2,290</td>
<td>12,699</td>
<td>2,656</td>
<td>41,633</td>
<td>7,416</td>
<td>28,934</td>
<td>4,760</td>
</tr>
<tr>
<td>February</td>
<td>1,532</td>
<td>331</td>
<td>9,939</td>
<td>2,069</td>
<td>11,470</td>
<td>2,399</td>
<td>37,604</td>
<td>6,698</td>
<td>26,134</td>
<td>4,299</td>
</tr>
<tr>
<td>March</td>
<td>1,696</td>
<td>366</td>
<td>11,003</td>
<td>2,290</td>
<td>12,699</td>
<td>2,656</td>
<td>41,633</td>
<td>7,416</td>
<td>28,934</td>
<td>4,760</td>
</tr>
<tr>
<td>April</td>
<td>1,641</td>
<td>354</td>
<td>10,648</td>
<td>2,216</td>
<td>12,290</td>
<td>2,571</td>
<td>40,290</td>
<td>7,177</td>
<td>28,001</td>
<td>4,606</td>
</tr>
<tr>
<td>May</td>
<td>1,696</td>
<td>366</td>
<td>11,003</td>
<td>2,290</td>
<td>12,699</td>
<td>2,656</td>
<td>41,633</td>
<td>7,416</td>
<td>28,934</td>
<td>4,760</td>
</tr>
<tr>
<td>June</td>
<td>1,641</td>
<td>354</td>
<td>10,648</td>
<td>2,216</td>
<td>12,290</td>
<td>2,571</td>
<td>40,290</td>
<td>7,177</td>
<td>28,001</td>
<td>4,606</td>
</tr>
<tr>
<td>July</td>
<td>1,696</td>
<td>366</td>
<td>11,003</td>
<td>2,290</td>
<td>12,699</td>
<td>2,656</td>
<td>41,633</td>
<td>7,416</td>
<td>28,934</td>
<td>4,760</td>
</tr>
<tr>
<td>August</td>
<td>1,696</td>
<td>366</td>
<td>11,003</td>
<td>2,290</td>
<td>12,699</td>
<td>2,656</td>
<td>41,633</td>
<td>7,416</td>
<td>28,934</td>
<td>4,760</td>
</tr>
<tr>
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<td>1,641</td>
<td>354</td>
<td>10,648</td>
<td>2,216</td>
<td>12,290</td>
<td>2,571</td>
<td>40,290</td>
<td>7,177</td>
<td>28,001</td>
<td>4,606</td>
</tr>
<tr>
<td>October</td>
<td>1,696</td>
<td>366</td>
<td>11,003</td>
<td>2,290</td>
<td>12,699</td>
<td>2,656</td>
<td>41,633</td>
<td>7,416</td>
<td>28,934</td>
<td>4,760</td>
</tr>
<tr>
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<td>1,641</td>
<td>354</td>
<td>10,648</td>
<td>2,216</td>
<td>12,290</td>
<td>2,571</td>
<td>40,290</td>
<td>7,177</td>
<td>28,001</td>
<td>4,606</td>
</tr>
<tr>
<td>December</td>
<td>1,696</td>
<td>366</td>
<td>11,003</td>
<td>2,290</td>
<td>12,699</td>
<td>2,656</td>
<td>41,633</td>
<td>7,416</td>
<td>28,934</td>
<td>4,760</td>
</tr>
<tr>
<td>Annual Total</td>
<td>19,968</td>
<td>4,311</td>
<td>129,556</td>
<td>26,966</td>
<td>149,524</td>
<td>31,277</td>
<td>490,200</td>
<td>87,317</td>
<td>340,676</td>
<td>56,040</td>
</tr>
</tbody>
</table>
Table 22B: Hawai‘i Dairy Farms Nutrient Mass Balance for 2,000 Mature Dairy Cows and 500 calves in Pens and Pasture

<table>
<thead>
<tr>
<th>Month</th>
<th>N Collected in Pond (lbs-N/mo)</th>
<th>P Collected in Pond (lbs-P/mo)</th>
<th>N Excreted on Pasture (lbs-N/mo)</th>
<th>P Excreted on Pasture (lbs-P/mo)</th>
<th>N Total Deposited on Farm (lbs-N/mo)</th>
<th>P Total Deposited on Farm (lbs-P/mo)</th>
<th>N Total Uptake from Farm (lbs-N/mo)</th>
<th>P Total Uptake from Farm (lbs-P/mo)</th>
<th>N Deficit (lbs-N/mo) (Fertilizer Need)</th>
<th>P Deficit (lbs-P/mo) (Fertilizer Need)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>4,956</td>
<td>1,080</td>
<td>31,791</td>
<td>6,650</td>
<td>36,747</td>
<td>7,730</td>
<td>41,633</td>
<td>7,416</td>
<td>4,887</td>
<td>(314)</td>
</tr>
<tr>
<td>February</td>
<td>4,477</td>
<td>976</td>
<td>28,714</td>
<td>6,006</td>
<td>33,191</td>
<td>6,982</td>
<td>37,604</td>
<td>6,698</td>
<td>4,414</td>
<td>(283)</td>
</tr>
<tr>
<td>March</td>
<td>4,956</td>
<td>1,080</td>
<td>31,791</td>
<td>6,650</td>
<td>36,747</td>
<td>7,730</td>
<td>41,633</td>
<td>7,416</td>
<td>4,887</td>
<td>(314)</td>
</tr>
<tr>
<td>April</td>
<td>4,796</td>
<td>1,045</td>
<td>30,765</td>
<td>6,435</td>
<td>35,561</td>
<td>7,480</td>
<td>40,290</td>
<td>7,177</td>
<td>4,729</td>
<td>(304)</td>
</tr>
<tr>
<td>May</td>
<td>4,956</td>
<td>1,080</td>
<td>31,791</td>
<td>6,650</td>
<td>36,747</td>
<td>7,730</td>
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<td>7,416</td>
<td>4,887</td>
<td>(314)</td>
</tr>
<tr>
<td>June</td>
<td>4,796</td>
<td>1,045</td>
<td>30,765</td>
<td>6,435</td>
<td>35,561</td>
<td>7,480</td>
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<td>7,177</td>
<td>4,729</td>
<td>(304)</td>
</tr>
<tr>
<td>July</td>
<td>4,956</td>
<td>1,080</td>
<td>31,791</td>
<td>6,650</td>
<td>36,747</td>
<td>7,730</td>
<td>41,633</td>
<td>7,416</td>
<td>4,887</td>
<td>(314)</td>
</tr>
<tr>
<td>August</td>
<td>4,956</td>
<td>1,080</td>
<td>31,791</td>
<td>6,650</td>
<td>36,747</td>
<td>7,730</td>
<td>41,633</td>
<td>7,416</td>
<td>4,887</td>
<td>(314)</td>
</tr>
<tr>
<td>September</td>
<td>4,796</td>
<td>1,045</td>
<td>30,765</td>
<td>6,435</td>
<td>35,561</td>
<td>7,480</td>
<td>40,290</td>
<td>7,177</td>
<td>4,729</td>
<td>(304)</td>
</tr>
<tr>
<td>October</td>
<td>4,956</td>
<td>1,080</td>
<td>31,791</td>
<td>6,650</td>
<td>36,747</td>
<td>7,730</td>
<td>41,633</td>
<td>7,416</td>
<td>4,887</td>
<td>(314)</td>
</tr>
<tr>
<td>November</td>
<td>4,796</td>
<td>1,045</td>
<td>30,765</td>
<td>6,435</td>
<td>35,561</td>
<td>7,480</td>
<td>40,290</td>
<td>7,177</td>
<td>4,729</td>
<td>(304)</td>
</tr>
<tr>
<td>December</td>
<td>4,956</td>
<td>1,080</td>
<td>31,791</td>
<td>6,650</td>
<td>36,747</td>
<td>7,730</td>
<td>41,633</td>
<td>7,416</td>
<td>4,887</td>
<td>(314)</td>
</tr>
<tr>
<td>Annual Total</td>
<td>58,356</td>
<td>12,720</td>
<td>374,308</td>
<td>78,293</td>
<td>432,664</td>
<td>91,012</td>
<td>490,200</td>
<td>87,317</td>
<td>57,536</td>
<td>***(3,695)</td>
</tr>
</tbody>
</table>

*** See next page.
Phosphorus is applied to the pasture as nutrient in the form of manure and fertilizer. At 699 mature dairy cows, the amount of phosphorus applied in the form of manure only (P Total Deposited on Farm in lbs/month) does not meet the crop demand (P Total Uptake From Farm in lbs/month) at a crop yield of 16.3 tons of DM per acre per year, as shown in the tables above. Additional phosphorus must be applied using commercial fertilizer to maintain high productivity and soil health. At 2,000 mature dairy cows, the amount of phosphorus applied in the form of manure only slightly exceeds the crop demand at a crop yield of 16.3 tons of DM per acre per year, as shown in the tables above. An excess of over 300 lbs of phosphorus per month could be expected.

As previously mentioned, nutrient management and mass balance analyses are dynamic and are influenced by the many different environmental variables that enter into nutrient cycle planning from grass yields, stocking density, manure nutrient content, soil nutrient content, and crop nutrient content.

Soils analyses currently indicate that the farm soils are extremely deficient in phosphorus. In the initial phases of the farm, HDF anticipates that larger amounts of phosphorus beyond the crop need will improve soil conditions, as the binding of phosphorus to the soil ensures that it stays in the soil profile and is available for continued use by the grass during the paddock’s 18-day rest period. Ultimately, when the farm is established after a few years, HDF intends to provide only the nutrient the grass crop needs, once the soil conditions improve and the farm nutrient balance and management becomes a "maintenance" operation. Until then, additional phosphorus, beyond the crop demand, is allowable in soils with low phosphorus leaching properties, per the NRCS Risk Analyses.

Based upon the soils health report by Dr. Russell Yost and Nicholas Krueger, University of Hawai‘i at Mānoa, College of Tropical Agriculture and Human Resources (CTAHR), an application of over 230,000 lbs of phosphorus per year over 469.9 acres of pasture will be beneficial to the current soil nutrient content to maximize productivity for the grass crop. The planned application for phosphorus for the 2,000 mature dairy cow herd is approximately 91,000 lbs of phosphorus annually. While 91,000 lbs of phosphorus per year, exceeds the crop uptake demand at a grass yield rate of 16.3 tons of DM per acre per year, representing a 3,700 lbs overage per year, the planned amount of applied phosphorus in this scenario is only a
fraction of what could be applied to improve soil conditions as recommended by Dr. Russell Yost when soil nutrient content was measured. At 699 mature dairy cows and 150 calves, there is simply a deficit of nutrient to meet crop demand, regardless of the soil nutrient conditions.

Other management options exist to keep phosphorus in balance. Higher grass yields would demand additional phosphorus. With an increase from the current 16.3 tons of dry matter (DM) per acre per year to a yield of 17.3 tons DM per acre per year, phosphorus demand by the pasture crop will eliminate any phosphorus overage at 2,000 mature dairy cows and 500 calves. Based on grass field trials by consultants to HDF, yields of 20 tons DM per acre per year are anticipated following establishment of the committed herd of 699 milking cows and several years of pasture maturation.

Should yields not increase as planned, the carrying capacity of the farm would be reduced to approximately 1,875 mature dairy cows (from 2,000 mature dairy cows). With reduced quantities of manure, phosphorus application levels would be in balance with phosphorus demands of the pasture, and meet the nutrient need of the grass without fertilizer.

It is critical to manage nitrogen applications as well, especially since nitrogen is soluble and typically moves through the environment quickly through rainfall, runoff, and groundwater. As shown by HDF's nutrient mass balance, however, in either the 699 mature dairy cow or up to 2,000 mature dairy cow scenario, nitrogen will not be applied in quantities exceeding the crop demand. In fact, nitrogen for commercial fertilizer will be required to maintain high pasture productivity and soil health.

### 8.4 Nutrient Application

As previously mentioned, managing the amount, source, placement, and timing of plant nutrients and soil amendments is critical for the nutrient balance of the farm. Application of these nutrients, whether via the liquid effluent collected in the storage pond, slurry suspended in the settling pond, as-excreted manure on the pasture, or commercial fertilizers used as supplement, must be managed to ensure that nutrient is not over-applied or under-applied to different areas of the farm. Multiple criteria must be taken into account when discussing application of nutrients and are discussed in further detail below. The following tables
represent a summary of the nutrient mass balance (from Section 8.3.9 - Nutrient Mass Balance) on the farm anticipated for 699 mature dairy cows and for up to 2,000 mature dairy cows. Refer also to Figure 18A & B – Nutrient Management Map.

Table 23A: Summary Nutrient Mass Balance for up to 699 Mature Dairy Cows

<table>
<thead>
<tr>
<th>Nutrient Application</th>
<th>Area (acre)</th>
<th>Nitrogen Applied (lbs N/ year)</th>
<th>Phosphorus Applied (lbs P₂O₅/ year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manure As-Excreted</td>
<td>469.9</td>
<td>129,556</td>
<td>26,966</td>
</tr>
<tr>
<td>Liquid Effluent</td>
<td>285.1</td>
<td>11,980.8</td>
<td>2,586.7</td>
</tr>
<tr>
<td>Slurry Application</td>
<td>42.0</td>
<td>7,987.2</td>
<td>1,724.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>149,524</strong></td>
<td><strong>31,277</strong></td>
</tr>
</tbody>
</table>

| Plant Nutrient Demand      |             | 490,200                        | 87,317                             |
| Percentage from Animals    |             | 30.5%                          | 35.8%                              |
| Required Chemical Fertilizer |         | 340,676                        | 56,040                             |
| Percentage Demand from Fertilizer | | 69.5%                          | 64.2%                              |

Table 23B: Summary Nutrient Mass Balance for up to 2,000 Mature Dairy Cows

<table>
<thead>
<tr>
<th>Nutrient Application</th>
<th>Area (acre)</th>
<th>Nitrogen Applied (lbs N/ year)</th>
<th>Phosphorus Applied (lbs P₂O₅/ year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manure As-Excreted</td>
<td>469.9</td>
<td>374,308</td>
<td>78,293</td>
</tr>
<tr>
<td>Liquid Effluent</td>
<td>285.1</td>
<td>35,013.7</td>
<td>7,631.7</td>
</tr>
<tr>
<td>Slurry Application</td>
<td>171.0</td>
<td>23,342.5</td>
<td>5,087.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>432,664</strong></td>
<td><strong>91,012</strong></td>
</tr>
</tbody>
</table>

| Plant Nutrient Demand      |             | 490,200                        | 87,317                             |
| Percentage from Animals    |             | 88.3%                          | 104.2%                             |
| Required Chemical Fertilizer |         | 57,536                         | (3,695)                            |
| Percentage Demand from Fertilizer | | 11.7%                          | (4.2)%                             |
Figure 18A – Nutrient Management Map (699-cow Herd Size Scenario)
Figure 18B – Nutrient Management Map (Up To 2,000-cow Herd Size Scenario)
8.4.1 Typical Liquid Effluent Application

Liquid effluent, containing vital nutrients for the Kikuyu crop that will support and feed the mature dairy cows on pasture, will be applied through either of the two center pivots, providing nutrient over a total application area of 285.1 acres (this area excludes the access roads, cow raceways, gun irrigation areas, and 50-ft. setback from drains/watercourses).

Although it is possible to apply effluent through both center pivot machines at the same time, it is much simpler from a management and control perspective to only apply effluent through one pivot machine at a time – the other pivot will either be applying only irrigation water or not operating. The best time to apply the effluent water is a few days after the cows have finished grazing, allowing for the as-excreted manure on the paddocks from the grazing cows to decompose and provide nutrients to the grass immediately after the paddock is used for grazing. This still allows approximately 15 days for the grass to utilize the nutrients from the pivot irrigation of liquid effluent before the cows next enter that paddock.

As mentioned in Section 6.1 – Pivot Irrigation System, the design allows both pivots to do a typical rotation every 48 hours, with a planned application of 0.39 inches of irrigation and effluent. The maximum flow rate from the pump injecting the effluent from the storage pond is 320 gallons per minute (gpm), which is 30% of the total flow capacity of the nozzle package fitted to either center pivot (capable of spraying at 1,030 gpm). During the 48-hour cycle, this means that a maximum of 0.12 inches of liquid effluent could be applied via injection into the irrigation water stream to the center pivot, as part of the full 0.39 inches of irrigation per cycle. However, at any given time, either pivots will not be applying 0.12 inches of liquid effluent per run, as the total volume of liquid effluent in each application would greatly exceed the stored amount of volume of effluent in the storage pond. More irrigation water in lieu of liquid effluent will be applied on a typical basis.

A typical liquid effluent application, which is planned for every 4 days during the spring, summer, and fall months, and whenever able based on rainfall, is shown below:
Table 24A: Typical Liquid Effluent Application

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Area (acre)</th>
<th>699 Scenario</th>
<th>2,000 Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Schedule (Days)</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Daily Effluent Generation</td>
<td>13,225.8 gpd</td>
<td>37,894.7 gpd</td>
<td></td>
</tr>
<tr>
<td>Available Liquid Effluent (4 days)</td>
<td>52,903 gal / cycle</td>
<td>151,579 gal / cycle</td>
<td></td>
</tr>
<tr>
<td>Pivot #1 Liquid Effluent</td>
<td>164.7</td>
<td>30,562 gal / cycle</td>
<td>87,567 gal / cycle</td>
</tr>
<tr>
<td>Pivot #2 Liquid Effluent</td>
<td>120.4</td>
<td>22,341 gal / cycle</td>
<td>64,012 gal / cycle</td>
</tr>
<tr>
<td><strong>Minimum</strong> Daily Irrigation Demand (Fall, Spring, Summer)</td>
<td>1,258,273 gpd</td>
<td>1,258,273 gpd</td>
<td></td>
</tr>
<tr>
<td>Required Irrigation Water Per Cycle</td>
<td>1,205,370 gal</td>
<td>1,106,694</td>
<td></td>
</tr>
<tr>
<td>Effluent Percentage of Irrigation</td>
<td>4%</td>
<td>12%</td>
<td></td>
</tr>
</tbody>
</table>

As the pivots apply effluent, the storage pond effluent level is managed and a safe buffer of spare volume is maintained.

Soil moisture and the amount of precipitation will ultimately determine the actual amount of both irrigation water and effluent to be applied in an application, with the deficit below field capacity determining the amount that can be applied. The number of rain days will dictate the schedule of both irrigation water and effluent application.

8.4.2 Liquid Effluent Application during the Winter Season

Effluent application during the wet winter months will be closely monitored such that the irrigation of effluent does not exceed the capacity of the soil, but also is not building up within the ponds, when irrigation demand of the crop is lowered due to higher amounts of rainfall. The center pivot irrigators can be adjusted to apply as little as 0.04 inches of irrigation per cycle, to minimize over-irrigation of the crop. The pivots can also be adjusted to apply liquid effluent and irrigation water at a 1:1 dilution, in lieu of the smaller percentages of effluent anticipated in a typical liquid effluent application, so that less irrigation water is needed per cycle.

In the winter, because more rain events are anticipated, longer periods between applications will be needed (still less than the 30-day storage period). As the number of available irrigation cycles per month decreases due to the rainy season, it is important to maximize effluent distribution while ensuring that the irrigation demands of the crop are not exceeded. A 1:1
dilution allows for more effluent application in some instances when irrigation can be applied, while the adjustment of the center pivot irrigators to provide less overall flow is important for control of the irrigation amounts to not exceed grass crop demands when there is more rain.

Table 24B: Maximized Liquid Effluent Application in Winter Months

<table>
<thead>
<tr>
<th>Parameter</th>
<th>699 Scenario</th>
<th>2,000 Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Flow Rate</td>
<td>320 gpm</td>
<td>320 gpm</td>
</tr>
<tr>
<td>Liquid Effluent Injected into Irrigation</td>
<td>0.05 inches</td>
<td>0.12 inches</td>
</tr>
<tr>
<td>Pivot #1 Liquid Effluent</td>
<td>164.7</td>
<td>229,247 gal / cycle</td>
</tr>
<tr>
<td>Pivot #2 Liquid Effluent</td>
<td>120.4</td>
<td>167,527 gal / cycle</td>
</tr>
<tr>
<td>Total Effluent Application</td>
<td>396,774 gal / cycle</td>
<td>928,938 gal / cycle</td>
</tr>
<tr>
<td>Volume of Liquid Effluent (in days)</td>
<td>30</td>
<td>24.5</td>
</tr>
<tr>
<td>Minimum Required Irrigation (1:1)</td>
<td>396,774 gal / cycle</td>
<td>928,938 gal / cycle</td>
</tr>
<tr>
<td>Total Irrigation Amount per Cycle (2 days)</td>
<td>793,548 gal / cycle</td>
<td>1,857,876 gal / cycle</td>
</tr>
<tr>
<td>Total Irrigation Amount per Day</td>
<td>396,774 gal</td>
<td>928,938 gal</td>
</tr>
<tr>
<td>Effective Irrigation Percentage</td>
<td>85%</td>
<td>85%</td>
</tr>
<tr>
<td>Effective Irrigation Per Day</td>
<td>337,258 gpd</td>
<td>789,597 gpd</td>
</tr>
<tr>
<td><strong>Minimum</strong> Daily Irrigation Demand (Winter)</td>
<td>839,474 gpd</td>
<td>839,474 gpd</td>
</tr>
</tbody>
</table>

Minimizing the amount of liquid effluent irrigation days means that the amount of liquid effluent application must be maximized to ensure proper management of the pond levels, but must be carefully balanced with the grass crop irrigation demand. The table indicates that running the pivots, at minimum, only twice a month during the wet winter months will ensure that the effluent levels in the ponds do not exceed the 30-day storage period, and that an application twice a month will not exceed the irrigation demand of the crop.

As the historical rain data indicates, having a period of more than 5 days of continuous rain (in which irrigation would be prohibited) is very unusual, with only 5 occurrences in the last 30 years. In most cases during the winter months, the application of liquid effluent may occur more than two times that month – utilizing less effluent each time and greater dilution.
Nutrient Balance Analysis  
May 24, 2016  

Operationally, both ponds also have the capacity to store suspended solids, liquid effluent, slurry mixing volume, normal precipitation for up to 30 days, and rainfall from the 25-year, 24-hour event. Therefore, the total required volume of both ponds, when completely full from 30 days’ worth of storage and no irrigation of effluent or application of slurry within that 30 day storage period is 2.28 MG or 2,276,645 gallons.

As previously mentioned, both pivots could apply 0.93 MG or 928,938 gallons of liquid effluent at maximum over two days. It would only take 3 application runs to completely empty both effluent ponds for a total application of 2.79 MG or 2,786,814 gallons of effluent, during a winter month. If running at 1:1 dilution, the minimum amount of total liquid effluent and irrigation water, combined, that would be applied over those three runs would be 5.58 MG or 5,573,628 gallons. Such application of liquid effluent and minimal irrigation water is still well below the total irrigation demand of the crop during the winter months, which varies between 26.7 MG and 31.0 MG, meaning that additional irrigation water will still be required to meet the irrigation needs of the grass. These monthly irrigation demands far exceed the required monthly volume capacity of the ponds for the 30-day storage period, showing that the ET of the crop ensures that irrigation of liquid effluent is required even during the winter months.

Further, the daily irrigation demands during the winter months range from 0.84 MG to 0.98 MG per day. While it may appear that the irrigation demand would be exceeded by a single run of both pivots with liquid effluent water and minimal irrigation water, there is room to cut back the amount applied. The center pivot irrigators can be adjusted to apply as little as 0.04 inches of liquid effluent per cycle or 0.31 MG of liquid effluent per run. The total irrigation application at 1:1 dilution is 0.62 MG, which is less than the daily irrigation demand low of 0.84 MG.

Finally, the liquid effluent applied by one run of either pivot, even at minimum application, is well above the daily effluent generation of 13,225.8 gallons per day (699 scenario) or 37,894.7 gallons per day (2,000 scenario), ensuring that the storage pond effluent level is cumulatively lowering after each application cycle, and that pond levels can be effectively managed.

As noted above, the center pivot technology used on the farm has been carefully selected to adequately adapt and apply the effluent in different volumes and capacities to manage irrigation and effluent application for the varying conditions between the seasons.
8.4.3 Slurry Application

The first of the effluent ponds is for the settling of solids (i.e. the settling pond). It will typically be filling with or full of liquid effluent, with the solids content having settled to the bottom and the liquid component then flowing from the top of this pond into the second pond for storage (i.e. the storage pond).

Solids (mostly soft organic matter, but also some sand and mud, etc.) will be mixed with liquid effluent or irrigation water into a slurry suspension, and will be applied on designated areas, at a minimum, of every 5 weeks (within 45 days). The slurry will be applied through a slurry gun irrigation system. The slurry gun system is separate from the hard-hose reel gun system used only for irrigation at the makai side of the farm.

The slurry application areas will vary based upon the number of mature dairy cows on the farm, as the total amount of slurry varies as well. In the initial herd size of 699 mature dairy cows, less manure is generated and less land area could be used to apply the slurry without exceeding the nutrient demand of the Kikuyu crop. Therefore, slurry can be applied, typically, in approximately 42 acres of non-irrigated areas on the eastern portion of the farm, which are outside of the liquid effluent application area from the center pivot as well as the gun irrigation system using only irrigation water. The extent of this type of application has been reviewed by DOH within the Waste Management Plan submitted for 699 mature dairy cows in July 2014. See Figure 19A – Slurry Management Map (Up To 699-cow Herd Size Scenario).

If and when the herd expands up to 2,000 mature dairy cows, more manure will be generated and management of the farm's nutrients will need the option to apply slurry to other nutrient deficient areas, which will likely include all non-irrigated areas on the farm, but also expand to include areas under the gun irrigation system. When it is determined that the slurry application has met the nutrient demand of the crop in a specific area, other areas will be utilized as needed to ensure that nutrients are not over-applied. This change in slurry application at the larger 2,000 mature dairy cow herd size, as compared to the reviewed 699 mature dairy cow Waste Management Plan, will be reviewed as part of a NPDES CAFO Permit application process. See Figure 19B – Slurry Management Map (Up To 2,000-cow Herd Size Scenario).
Figure 19A – Slurry Management Map (Up To 699-cow Herd Size Scenario)
Figure 19B – Slurry Management Map (Up To 2,000-cow Herd Size Scenario)
It is not anticipated that the area within the liquid effluent application area from the center pivots will receive slurry, although based upon the nutrient requirement of these areas, slurry could be applied in lieu of using more commercial fertilizer. Typically, however, HDF will not utilize the areas under the pivots for slurry application, so that nutrients are spread out upon areas not already receiving nutrients from liquid effluent. However, as the slurry is meant to offset the need for commercial fertilizer, slurry may be applied in any location on the farm where it is determined such application would not exceed the nutrient demand of the Kikuyu crop, regardless of where or how the nutrient is supplied (as-excreted manure, liquid effluent from the ponds, slurry, or commercial fertilizer). Proper utilization of the slurry nutrients may reduce the need for commercial fertilizer, reduce operating costs, and improve soil health as a natural source of soil nutrient. As previously mentioned, the application of slurry within the larger 2,000 mature dairy cow scenario will be reviewed as part of the NPDES CAFO Permit application process.

While the total volume of the settling pond will be emptied at least every 45 days, operationally, HDF expects to apply slurry more often than just once every 45 days, helping to manage levels within the settling pond and thereby reducing the overall volume utilized within the storage pond, as more liquid effluent in the settling pond would be used as mixing volume for slurry application in lieu of being injected into the center pivots from the storage pond. Each application of slurry will be managed by area and volume, to ensure nutrients or irrigation water is not excessively applied in any particular area, exceeding Kikuyu crop nutrient demand. Applications will be timed to prevent and eliminate opportunities for nutrients to potentially run off the site.

The slurry application consists of bringing the solids into suspension through adding liquid mixing volume, to the settling pond’s capacity, and then stirring the pond. This liquid, along with the suspended solids, is then pumped through a 4-inch underground pipe to a number of hydrants which have a 'gun sprinkler' with a 5/8-inch nozzle attached via a length of flexible hose. The guns (and their 65-foot radius of spray area) will be moved around the paddocks after a period of running so that the solids become evenly spread.
Under normal circumstances there will be two guns running and the pump will be pumping 158 gpm. At this rate it will take approximately a total of 40 hours to nearly empty the settling pond, when full, depending on the amount of mixing volume.

### 8.4.4 Nutrient Mass Balance by Application

As indicated, nutrients are applied to pasture via four different mechanisms and sources: 1) manure as-excreted on pasture by the mature dairy cows, 2) liquid effluent collected at the dairy facility applied by the center pivot system, 3) suspended solids collected at the dairy facility applied as slurry by a gun sprinkler system, and 4) commercial fertilizer applications.

Each method of applying nutrients must be managed by area and volume, to ensure nutrients are not excessively applied in any particular area, exceeding Kikuyu crop nutrient demand. Applications will be timed to prevent and eliminate opportunities for nutrients to potentially run off the site.

The following tables show the nutrient mass balance of each application type, with the deficit of nutrient equal to the required amount of nutrient to be applied from commercial fertilizer.
Table 25: Estimated Monthly Nutrient Generation Collected in Manure Storage System (Operational) for 699 Mature Dairy Cows and 50 Calves in Pens

<table>
<thead>
<tr>
<th>Month</th>
<th>Settled Nutrient Content in Settling Pond (%)</th>
<th>N Collected in Settling Pond (lbs-N/mo)</th>
<th>P Collected in Settling Pond (lbs-N/mo)</th>
<th>Liquid Nutrient Content in Storage Pond (%)</th>
<th>N Collected in Storage Pond (lbs-N/mo)</th>
<th>P Collected in Storage Pond (lbs-N/mo)</th>
<th>N Excreted on Pasture (lbs-N/mo)</th>
<th>P Excreted on Pasture (lbs-P/mo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>40%</td>
<td>678</td>
<td>146</td>
<td>60%</td>
<td>1,018</td>
<td>220</td>
<td>11,003</td>
<td>2,290</td>
</tr>
<tr>
<td>February</td>
<td>40%</td>
<td>613</td>
<td>132</td>
<td>60%</td>
<td>919</td>
<td>198</td>
<td>9,939</td>
<td>2,069</td>
</tr>
<tr>
<td>March</td>
<td>40%</td>
<td>678</td>
<td>146</td>
<td>60%</td>
<td>1,018</td>
<td>220</td>
<td>11,003</td>
<td>2,290</td>
</tr>
<tr>
<td>April</td>
<td>40%</td>
<td>656</td>
<td>142</td>
<td>60%</td>
<td>985</td>
<td>213</td>
<td>10,648</td>
<td>2,216</td>
</tr>
<tr>
<td>May</td>
<td>40%</td>
<td>678</td>
<td>146</td>
<td>60%</td>
<td>1,018</td>
<td>220</td>
<td>11,003</td>
<td>2,290</td>
</tr>
<tr>
<td>June</td>
<td>40%</td>
<td>656</td>
<td>142</td>
<td>60%</td>
<td>985</td>
<td>213</td>
<td>10,648</td>
<td>2,216</td>
</tr>
<tr>
<td>July</td>
<td>40%</td>
<td>678</td>
<td>146</td>
<td>60%</td>
<td>1,018</td>
<td>220</td>
<td>11,003</td>
<td>2,290</td>
</tr>
<tr>
<td>August</td>
<td>40%</td>
<td>678</td>
<td>146</td>
<td>60%</td>
<td>1,018</td>
<td>220</td>
<td>11,003</td>
<td>2,290</td>
</tr>
<tr>
<td>September</td>
<td>40%</td>
<td>656</td>
<td>142</td>
<td>60%</td>
<td>985</td>
<td>213</td>
<td>10,648</td>
<td>2,216</td>
</tr>
<tr>
<td>October</td>
<td>40%</td>
<td>678</td>
<td>146</td>
<td>60%</td>
<td>1,018</td>
<td>220</td>
<td>11,003</td>
<td>2,290</td>
</tr>
<tr>
<td>November</td>
<td>40%</td>
<td>656</td>
<td>142</td>
<td>60%</td>
<td>985</td>
<td>213</td>
<td>10,648</td>
<td>2,216</td>
</tr>
<tr>
<td>December</td>
<td>40%</td>
<td>678</td>
<td>146</td>
<td>60%</td>
<td>1,018</td>
<td>220</td>
<td>11,003</td>
<td>2,290</td>
</tr>
<tr>
<td>Annual Total</td>
<td></td>
<td>7,987</td>
<td>1,724</td>
<td>11,981</td>
<td>2,587</td>
<td>129,556</td>
<td>26,966</td>
<td></td>
</tr>
</tbody>
</table>
Table 26A: Estimated Monthly Nutrient on Non-Irrigated Areas for 699 Mature Dairy Cows and 50 Calves in Pen

<table>
<thead>
<tr>
<th>Month</th>
<th>N Applied on Non-Irrigated Areas (lbs-N/mo)</th>
<th>P Applied on Non-Irrigated Areas (lbs-N/mo)</th>
<th>N Uptake by Grass from Non-Irrigated Areas (lbs-N/mo)</th>
<th>P Uptake by Grass from Non-Irrigated Areas (lbs-N/mo)</th>
<th>N Deficit (lbs-N/mo) (Fertilizer Need)</th>
<th>P Deficit (lbs-P/mo) (Fertilizer Need)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>3,344</td>
<td>696</td>
<td>12,652</td>
<td>2,254</td>
<td>9,308</td>
<td>1,558</td>
</tr>
<tr>
<td>February</td>
<td>3,020</td>
<td>629</td>
<td>11,428</td>
<td>2,036</td>
<td>8,407</td>
<td>1,407</td>
</tr>
<tr>
<td>March</td>
<td>3,344</td>
<td>696</td>
<td>12,652</td>
<td>2,254</td>
<td>9,308</td>
<td>1,558</td>
</tr>
<tr>
<td>April</td>
<td>3,236</td>
<td>674</td>
<td>12,244</td>
<td>2,181</td>
<td>9,008</td>
<td>1,507</td>
</tr>
<tr>
<td>May</td>
<td>3,344</td>
<td>696</td>
<td>12,652</td>
<td>2,254</td>
<td>9,308</td>
<td>1,558</td>
</tr>
<tr>
<td>June</td>
<td>3,236</td>
<td>674</td>
<td>12,244</td>
<td>2,181</td>
<td>9,008</td>
<td>1,507</td>
</tr>
<tr>
<td>July</td>
<td>3,344</td>
<td>696</td>
<td>12,652</td>
<td>2,254</td>
<td>9,308</td>
<td>1,558</td>
</tr>
<tr>
<td>August</td>
<td>3,344</td>
<td>696</td>
<td>12,652</td>
<td>2,254</td>
<td>9,308</td>
<td>1,558</td>
</tr>
<tr>
<td>September</td>
<td>3,236</td>
<td>674</td>
<td>12,244</td>
<td>2,181</td>
<td>9,008</td>
<td>1,507</td>
</tr>
<tr>
<td>October</td>
<td>3,344</td>
<td>696</td>
<td>12,652</td>
<td>2,254</td>
<td>9,308</td>
<td>1,558</td>
</tr>
<tr>
<td>November</td>
<td>3,236</td>
<td>674</td>
<td>12,244</td>
<td>2,181</td>
<td>9,008</td>
<td>1,507</td>
</tr>
<tr>
<td>December</td>
<td>3,344</td>
<td>696</td>
<td>12,652</td>
<td>2,254</td>
<td>9,308</td>
<td>1,558</td>
</tr>
<tr>
<td>Annual Total</td>
<td><strong>39,371</strong></td>
<td><strong>8,195</strong></td>
<td><strong>148,969</strong></td>
<td><strong>26,535</strong></td>
<td><strong>109,598</strong></td>
<td><strong>18,340</strong></td>
</tr>
</tbody>
</table>

* 142.8 Acres of Gun Irrigated Areas, A Portion of Non-Irrigated Areas, and Pasture Area within 50’ Setback. Areas receive only as-excreted manure in 699 cow scenario.

** 50 Calves in Pens Accounted For. 100 Calves in Pasture.
### Table 26B: Estimated Monthly Nutrient Application on Center Pivot Areas for 699 Mature Dairy Cows and 50 Calves in Pen

<table>
<thead>
<tr>
<th>Month</th>
<th>N Applied on Center Pivot Areas (lbs-N/mo)</th>
<th>P Applied on Center Pivot Areas (lbs-N/mo)</th>
<th>N Uptake by Grass from Center Pivot Areas (lbs-N/mo)</th>
<th>P Uptake by Grass from Center Pivot Areas (lbs-N/mo)</th>
<th>N Deficit (lbs-N/mo) (Fertilizer Need)</th>
<th>P Deficit (lbs-P/mo) (Fertilizer Need)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>7,694</td>
<td>1,609</td>
<td>25,260</td>
<td>4,499</td>
<td>17,566</td>
<td>2,890</td>
</tr>
<tr>
<td>February</td>
<td>6,949</td>
<td>1,454</td>
<td>22,815</td>
<td>4,064</td>
<td>15,866</td>
<td>2,611</td>
</tr>
<tr>
<td>March</td>
<td>7,694</td>
<td>1,609</td>
<td>25,260</td>
<td>4,499</td>
<td>17,566</td>
<td>2,890</td>
</tr>
<tr>
<td>April</td>
<td>7,445</td>
<td>1,557</td>
<td>24,445</td>
<td>4,354</td>
<td>17,000</td>
<td>2,797</td>
</tr>
<tr>
<td>May</td>
<td>7,694</td>
<td>1,609</td>
<td>25,260</td>
<td>4,499</td>
<td>17,566</td>
<td>2,890</td>
</tr>
<tr>
<td>June</td>
<td>7,445</td>
<td>1,557</td>
<td>24,445</td>
<td>4,354</td>
<td>17,000</td>
<td>2,797</td>
</tr>
<tr>
<td>July</td>
<td>7,694</td>
<td>1,609</td>
<td>25,260</td>
<td>4,499</td>
<td>17,566</td>
<td>2,890</td>
</tr>
<tr>
<td>August</td>
<td>7,694</td>
<td>1,609</td>
<td>25,260</td>
<td>4,499</td>
<td>17,566</td>
<td>2,890</td>
</tr>
<tr>
<td>September</td>
<td>7,445</td>
<td>1,557</td>
<td>24,445</td>
<td>4,354</td>
<td>17,000</td>
<td>2,797</td>
</tr>
<tr>
<td>October</td>
<td>7,694</td>
<td>1,609</td>
<td>25,260</td>
<td>4,499</td>
<td>17,566</td>
<td>2,890</td>
</tr>
<tr>
<td>November</td>
<td>7,445</td>
<td>1,557</td>
<td>24,445</td>
<td>4,354</td>
<td>17,000</td>
<td>2,797</td>
</tr>
<tr>
<td>December</td>
<td>7,694</td>
<td>1,609</td>
<td>25,260</td>
<td>4,499</td>
<td>17,566</td>
<td>2,890</td>
</tr>
<tr>
<td>Annual Total</td>
<td>90,585</td>
<td>18,947</td>
<td>297,416</td>
<td>52,977</td>
<td>206,831</td>
<td>34,030</td>
</tr>
</tbody>
</table>

* 285.1 Acres of Area under the Center Pivot. Area receives both as-excreted manure and liquid effluent from the storage pond in 699 cow scenario.
** 50 Calves in Pens Accounted For. 100 Calves in Pasture.
## Table 26C: Estimated Monthly Nutrient Application on Slurry Areas for 699 Mature Dairy Cows and 50 Calves in Pen

<table>
<thead>
<tr>
<th>Month</th>
<th>N Applied on Slurry Areas (lbs-N/mo)</th>
<th>P Applied on Slurry Areas (lbs-N/mo)</th>
<th>N Uptake by Grass from Slurry Areas (lbs-N/mo)</th>
<th>P Uptake by Grass from Slurry Areas (lbs-N/mo)</th>
<th>N Deficit (lbs-N/mo) (Fertilizer Need)</th>
<th>P Deficit (lbs-P/mo) (Fertilizer Need)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>1,662</td>
<td>351</td>
<td>3,721</td>
<td>663</td>
<td>2,059</td>
<td>312</td>
</tr>
<tr>
<td>February</td>
<td>1,501</td>
<td>317</td>
<td>3,361</td>
<td>599</td>
<td>1,860</td>
<td>282</td>
</tr>
<tr>
<td>March</td>
<td>1,662</td>
<td>351</td>
<td>3,721</td>
<td>663</td>
<td>2,059</td>
<td>312</td>
</tr>
<tr>
<td>April</td>
<td>1,608</td>
<td>340</td>
<td>3,601</td>
<td>641</td>
<td>1,993</td>
<td>302</td>
</tr>
<tr>
<td>May</td>
<td>1,662</td>
<td>351</td>
<td>3,721</td>
<td>663</td>
<td>2,059</td>
<td>312</td>
</tr>
<tr>
<td>June</td>
<td>1,608</td>
<td>340</td>
<td>3,601</td>
<td>641</td>
<td>1,993</td>
<td>302</td>
</tr>
<tr>
<td>July</td>
<td>1,662</td>
<td>351</td>
<td>3,721</td>
<td>663</td>
<td>2,059</td>
<td>312</td>
</tr>
<tr>
<td>August</td>
<td>1,662</td>
<td>351</td>
<td>3,721</td>
<td>663</td>
<td>2,059</td>
<td>312</td>
</tr>
<tr>
<td>September</td>
<td>1,608</td>
<td>340</td>
<td>3,601</td>
<td>641</td>
<td>1,993</td>
<td>302</td>
</tr>
<tr>
<td>October</td>
<td>1,662</td>
<td>351</td>
<td>3,721</td>
<td>663</td>
<td>2,059</td>
<td>312</td>
</tr>
<tr>
<td>November</td>
<td>1,608</td>
<td>340</td>
<td>3,601</td>
<td>641</td>
<td>1,993</td>
<td>302</td>
</tr>
<tr>
<td>December</td>
<td>1,662</td>
<td>351</td>
<td>3,721</td>
<td>663</td>
<td>2,059</td>
<td>312</td>
</tr>
<tr>
<td>Annual Total</td>
<td>19,567</td>
<td>4,135</td>
<td>43,814</td>
<td>7,804</td>
<td>24,247</td>
<td>3,670</td>
</tr>
</tbody>
</table>

* 42 Acres of Area under the Slurry Gun Application. Area receives both as-excreted manure and slurry effluent from the settling pond in 699 cow scenario.
** 50 Calves in Pens Accounted For. 100 Calves in Pasture.
Table 27: Estimated Monthly Nutrient Generation Collected in Manure Storage System (Operational) for 2,000 Mature Dairy Cows and 167 Calves in Pens

<table>
<thead>
<tr>
<th>Month</th>
<th>Settled Nutrient Content in Settling Pond (%)</th>
<th>N Collected in Settling Pond (lbs-N/mo)</th>
<th>N Collected in Settling Pond (%)</th>
<th>P Collected in Settling Pond (lbs-N/mo)</th>
<th>P Collected in Settling Pond (%)</th>
<th>N Excreted on Pasture (lbs-N/mo)</th>
<th>P Excreted on Pasture (lbs-P/mo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>40%</td>
<td>1,983</td>
<td>432</td>
<td>60%</td>
<td>2,974</td>
<td>648</td>
<td>31,791</td>
</tr>
<tr>
<td>February</td>
<td>40%</td>
<td>1,791</td>
<td>390</td>
<td>60%</td>
<td>2,686</td>
<td>585</td>
<td>28,714</td>
</tr>
<tr>
<td>March</td>
<td>40%</td>
<td>1,983</td>
<td>432</td>
<td>60%</td>
<td>2,974</td>
<td>648</td>
<td>31,791</td>
</tr>
<tr>
<td>April</td>
<td>40%</td>
<td>1,919</td>
<td>418</td>
<td>60%</td>
<td>2,878</td>
<td>627</td>
<td>30,765</td>
</tr>
<tr>
<td>May</td>
<td>40%</td>
<td>1,983</td>
<td>432</td>
<td>60%</td>
<td>2,974</td>
<td>648</td>
<td>31,791</td>
</tr>
<tr>
<td>June</td>
<td>40%</td>
<td>1,919</td>
<td>418</td>
<td>60%</td>
<td>2,878</td>
<td>627</td>
<td>30,765</td>
</tr>
<tr>
<td>July</td>
<td>40%</td>
<td>1,983</td>
<td>432</td>
<td>60%</td>
<td>2,974</td>
<td>648</td>
<td>31,791</td>
</tr>
<tr>
<td>August</td>
<td>40%</td>
<td>1,983</td>
<td>432</td>
<td>60%</td>
<td>2,974</td>
<td>648</td>
<td>31,791</td>
</tr>
<tr>
<td>September</td>
<td>40%</td>
<td>1,919</td>
<td>418</td>
<td>60%</td>
<td>2,878</td>
<td>627</td>
<td>30,765</td>
</tr>
<tr>
<td>October</td>
<td>40%</td>
<td>1,983</td>
<td>432</td>
<td>60%</td>
<td>2,974</td>
<td>648</td>
<td>31,791</td>
</tr>
<tr>
<td>November</td>
<td>40%</td>
<td>1,919</td>
<td>418</td>
<td>60%</td>
<td>2,878</td>
<td>627</td>
<td>30,765</td>
</tr>
<tr>
<td>December</td>
<td>40%</td>
<td>1,983</td>
<td>432</td>
<td>60%</td>
<td>2,974</td>
<td>648</td>
<td>31,791</td>
</tr>
<tr>
<td>Annual Total</td>
<td></td>
<td>23,342</td>
<td>5,088</td>
<td></td>
<td>35,014</td>
<td>7,632</td>
<td>374,308</td>
</tr>
</tbody>
</table>
**Table 28A: Estimated Monthly Nutrient on Non-Irrigated Areas for 2,000 Mature Dairy Cows and 167 Calves in Pen**

<table>
<thead>
<tr>
<th>Month</th>
<th>N Applied on Non-Irrigated Areas (lbs-N/mo)</th>
<th>P Applied on Non-Irrigated Areas (lbs-N/mo)</th>
<th>N Uptake by Grass from Non-Irrigated Areas (lbs-N/mo)</th>
<th>P Uptake by Grass from Non-Irrigated Areas (lbs-N/mo)</th>
<th>N Deficit (lbs-N/mo) (Fertilizer Need)</th>
<th>P Deficit (lbs-P/mo) (Fertilizer Need)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>934</td>
<td>195</td>
<td>1,223</td>
<td>218</td>
<td>289</td>
<td>23</td>
</tr>
<tr>
<td>February</td>
<td>843</td>
<td>176</td>
<td>1,104</td>
<td>197</td>
<td>261</td>
<td>20</td>
</tr>
<tr>
<td>March</td>
<td>934</td>
<td>195</td>
<td>1,223</td>
<td>218</td>
<td>289</td>
<td>23</td>
</tr>
<tr>
<td>April</td>
<td>904</td>
<td>189</td>
<td>1,183</td>
<td>211</td>
<td>280</td>
<td>22</td>
</tr>
<tr>
<td>May</td>
<td>934</td>
<td>195</td>
<td>1,223</td>
<td>218</td>
<td>289</td>
<td>23</td>
</tr>
<tr>
<td>June</td>
<td>904</td>
<td>189</td>
<td>1,183</td>
<td>211</td>
<td>280</td>
<td>22</td>
</tr>
<tr>
<td>July</td>
<td>934</td>
<td>195</td>
<td>1,223</td>
<td>218</td>
<td>289</td>
<td>23</td>
</tr>
<tr>
<td>August</td>
<td>934</td>
<td>195</td>
<td>1,223</td>
<td>218</td>
<td>289</td>
<td>23</td>
</tr>
<tr>
<td>September</td>
<td>904</td>
<td>189</td>
<td>1,183</td>
<td>211</td>
<td>280</td>
<td>22</td>
</tr>
<tr>
<td>October</td>
<td>934</td>
<td>195</td>
<td>1,223</td>
<td>218</td>
<td>289</td>
<td>23</td>
</tr>
<tr>
<td>November</td>
<td>904</td>
<td>189</td>
<td>1,183</td>
<td>211</td>
<td>280</td>
<td>22</td>
</tr>
<tr>
<td>December</td>
<td>934</td>
<td>195</td>
<td>1,223</td>
<td>218</td>
<td>289</td>
<td>23</td>
</tr>
<tr>
<td>Annual Total</td>
<td>10,993</td>
<td>2,299</td>
<td>14,396</td>
<td>2,564</td>
<td>3,404</td>
<td>265</td>
</tr>
</tbody>
</table>

* 13.8 Acres of Pasture Area within 50' Setback. Area receives only as-excreted manure in 2,000 cow scenario.

** 167 Calves in Pens Accounted For. 333 Calves in Pasture.
Table 28B: Estimated Monthly Nutrient Application on Center Pivot Areas for 2,000 Mature Dairy Cows and 167 Calves in Pen

<table>
<thead>
<tr>
<th>Month</th>
<th>N Applied on Center Pivot Areas (lbs-N/mo)</th>
<th>P Applied on Center Pivot Areas (lbs-N/mo)</th>
<th>N Uptake by Grass from Center Pivot Areas (lbs-N/mo)</th>
<th>P Uptake by Grass from Center Pivot Areas (lbs-N/mo)</th>
<th>N Deficit (lbs-N/mo) (Fertilizer Need)</th>
<th>P Deficit (lbs-P/mo) (Fertilizer Need)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>22,262</td>
<td>4,683</td>
<td>25,260</td>
<td>4,499</td>
<td>2,998</td>
<td>(183)</td>
</tr>
<tr>
<td>February</td>
<td>20,107</td>
<td>4,229</td>
<td>22,815</td>
<td>4,064</td>
<td>2,708</td>
<td>(165)</td>
</tr>
<tr>
<td>March</td>
<td>22,262</td>
<td>4,683</td>
<td>25,260</td>
<td>4,499</td>
<td>2,998</td>
<td>(183)</td>
</tr>
<tr>
<td>April</td>
<td>21,544</td>
<td>4,532</td>
<td>24,445</td>
<td>4,354</td>
<td>2,901</td>
<td>(177)</td>
</tr>
<tr>
<td>May</td>
<td>22,262</td>
<td>4,683</td>
<td>25,260</td>
<td>4,499</td>
<td>2,998</td>
<td>(183)</td>
</tr>
<tr>
<td>June</td>
<td>21,544</td>
<td>4,532</td>
<td>24,445</td>
<td>4,354</td>
<td>2,901</td>
<td>(177)</td>
</tr>
<tr>
<td>July</td>
<td>22,262</td>
<td>4,683</td>
<td>25,260</td>
<td>4,499</td>
<td>2,998</td>
<td>(183)</td>
</tr>
<tr>
<td>August</td>
<td>22,262</td>
<td>4,683</td>
<td>25,260</td>
<td>4,499</td>
<td>2,998</td>
<td>(183)</td>
</tr>
<tr>
<td>September</td>
<td>21,544</td>
<td>4,532</td>
<td>24,445</td>
<td>4,354</td>
<td>2,901</td>
<td>(177)</td>
</tr>
<tr>
<td>October</td>
<td>22,262</td>
<td>4,683</td>
<td>25,260</td>
<td>4,499</td>
<td>2,998</td>
<td>(183)</td>
</tr>
<tr>
<td>November</td>
<td>21,544</td>
<td>4,532</td>
<td>24,445</td>
<td>4,354</td>
<td>2,901</td>
<td>(177)</td>
</tr>
<tr>
<td>December</td>
<td>22,262</td>
<td>4,683</td>
<td>25,260</td>
<td>4,499</td>
<td>2,998</td>
<td>(183)</td>
</tr>
<tr>
<td>Annual Total</td>
<td>262,115</td>
<td>55,134</td>
<td>297,416</td>
<td>52,977</td>
<td>35,301</td>
<td><strong>(2,156)</strong></td>
</tr>
</tbody>
</table>

* 285.1 Acres of Area under the Center Pivot. Area receives both as-excreted manure and liquid effluent from the storage pond in 2,000 cow scenario.
** 167 Calves in Pens Accounted For. 333 Calves in Pasture.
*** See Note Next Pages
### Table 28C: Estimated Monthly Nutrient Application on Slurry Areas for 2,000 Mature Dairy Cows and 167 Calves in Pen

<table>
<thead>
<tr>
<th>Month</th>
<th>N Applied on Slurry Areas (lbs-N/mo)</th>
<th>P Applied on Slurry Areas (lbs-N/mo)</th>
<th>N Uptake by Grass from Slurry Areas (lbs-N/mo)</th>
<th>P Uptake by Grass from Slurry Areas (lbs-N/mo)</th>
<th>N Deficit (lbs-N/mo) (Fertilizer Need)</th>
<th>P Deficit (lbs-P/mo) (Fertilizer Need)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>13,551</td>
<td>2,852</td>
<td>15,151</td>
<td>2,699</td>
<td>1,599</td>
<td>(153)</td>
</tr>
<tr>
<td>February</td>
<td>12,240</td>
<td>2,576</td>
<td>13,684</td>
<td>2,438</td>
<td>1,445</td>
<td>(138)</td>
</tr>
<tr>
<td>March</td>
<td>13,551</td>
<td>2,852</td>
<td>15,151</td>
<td>2,699</td>
<td>1,599</td>
<td>(153)</td>
</tr>
<tr>
<td>April</td>
<td>13,114</td>
<td>2,760</td>
<td>14,662</td>
<td>2,612</td>
<td>1,548</td>
<td>(148)</td>
</tr>
<tr>
<td>May</td>
<td>13,551</td>
<td>2,852</td>
<td>15,151</td>
<td>2,699</td>
<td>1,599</td>
<td>(153)</td>
</tr>
<tr>
<td>June</td>
<td>13,114</td>
<td>2,760</td>
<td>14,662</td>
<td>2,612</td>
<td>1,548</td>
<td>(148)</td>
</tr>
<tr>
<td>July</td>
<td>13,551</td>
<td>2,852</td>
<td>15,151</td>
<td>2,699</td>
<td>1,599</td>
<td>(153)</td>
</tr>
<tr>
<td>August</td>
<td>13,551</td>
<td>2,852</td>
<td>15,151</td>
<td>2,699</td>
<td>1,599</td>
<td>(153)</td>
</tr>
<tr>
<td>September</td>
<td>13,114</td>
<td>2,760</td>
<td>14,662</td>
<td>2,612</td>
<td>1,548</td>
<td>(148)</td>
</tr>
<tr>
<td>October</td>
<td>13,551</td>
<td>2,852</td>
<td>15,151</td>
<td>2,699</td>
<td>1,599</td>
<td>(153)</td>
</tr>
<tr>
<td>November</td>
<td>13,114</td>
<td>2,760</td>
<td>14,662</td>
<td>2,612</td>
<td>1,548</td>
<td>(148)</td>
</tr>
<tr>
<td>December</td>
<td>13,551</td>
<td>2,852</td>
<td>15,151</td>
<td>2,699</td>
<td>1,599</td>
<td>(153)</td>
</tr>
<tr>
<td>Annual Total</td>
<td>159,556</td>
<td>33,579</td>
<td>178,387</td>
<td>31,775</td>
<td>18,832</td>
<td>***(1,804) ***</td>
</tr>
</tbody>
</table>

* 171 Acres of Area under the Slurry Gun Application. Area receives both as-excreted manure and slurry effluent from the settling pond in 2,000 cow scenario.
** 167 Calves in Pens Accounted For. 333 Calves in Pasture.
*** See next page and Section 8.3.9 - Nutrient Mass Balance
Nutrient Balance Analysis  
May 24, 2016

As discussed in **Section 8.3.9 - Nutrient Mass Balance**, phosphorus is applied to the pasture as nutrient in the form of manure and fertilizer. As shown in the tables above, at 699 mature dairy cows, the amount of phosphorus applied in the form of manure only (P Total Deposited on Farm in lbs/month) does not meet the crop demand (P Total Uptake From Farm in lbs/month) at a crop yield of 16.3 tons of DM per acre per year, regardless of the how the nutrient is applied (as-excreted, liquid effluent, or slurry). Additional phosphorus must be applied using commercial fertilizer to maintain high productivity and soil health. At 2,000 mature dairy cows, the amount of phosphorus applied in the form of manure only slightly exceeds the crop demand at a crop yield of 16.3 tons of DM per acre per year, in both the liquid application and slurry application areas. An excess of over 300 lbs of phosphorus per month from these two application types, could be expected.

As previously mentioned, nutrient management and mass balance analyses are dynamic and are influenced by the many different environmental variables that enter into nutrient cycle planning from grass yields, stocking density, manure nutrient content, soil nutrient content, and crop nutrient content. Refer to the discussion in **Section 8.3.9 - Nutrient Mass Balance**, for options to manage phosphorus on the farm, which may include and are not limited to planned additions of phosphorus to improve soil health, reduction in the carrying capacity of the farm to approximately 1,875 mature dairy cows from up to 2,000 mature dairy cows, or the expected increase in the grass yields from 16.3 tons of DM per acre per year to 20 tons of DM per acre per year (though an increase to 17.3 tons of DM per acre per year would be sufficient to bring phosphorus applications back into balance with crop demand).

### 8.4.5 Contingency Applications

It should be noted that the ponds are sized to accommodate 30 days of storage of effluent, normal precipitation, and the 25-year, 24-hour storm event. It will be highly unlikely that the storage pond will be full at any time, which would require a set of highly unlikely events occurring at the same time (large storm events in tandem, extended heavy rain periods, no irrigation days, no application of the settling pond slurry, and spare volume / buffers filled). At 699 mature dairy cows, the spare volume in the storage pond (as the ponds were designed for 2,000 cows) provides an even greater factor of safety. Throughout the 30-day storage period,
Nutrient Balance Analysis  
May 24, 2016  

Effluent is planned for application every 4 days and the slurry application is expected at least once every 45 days, ensuring that the pond levels are kept at manageable levels.

Nonetheless, if the storage pond were full and if a cataclysmic storm was forecast, the time to empty the pond is around 100 hours. If warranted due to potential impact from an approaching storm event, the settling pond could also be pumped empty within an additional 40 hours. If the forecasted storm is forecast six days prior, then virtually no effluent would remain in the ponds when the storm arrives.

8.4.6 Nutrient Application Schedule  
Manure effluent is typically applied in liquid form with irrigation equipment, and application conditions are documented in the Nutrient Management Plan. All materials will be handled in a manner to minimize the generation of particulate matter, odors and greenhouse gases.

Solid manure effluent will be brought into a liquid suspension and also applied in liquid form with irrigation equipment. Similarly, application conditions are documented in the Nutrient Management Plan. All materials will be handled in a manner to minimize the generation of particulate matter, odors and greenhouse gases.

Manure effluent will be applied at a rate significantly less than the crop (Kikuyu) nutrient requirements and best management practices will be used for maintenance of soil structure. Manure effluent will be applied on recently grazed paddocks and before pasture re-growth starts.

8.4.7 Potential Special Management Areas  
The Māhāʻulepū soils, particularly in the south-central portion of the farm are perceived as heavy, flood frequently and are difficult to grow crops upon. Much of the water from the northern part of the farm runs through this area. The dominant soils on the lower farm are Kaʻena Clay, Kalapa Silty Clay and Kalihi Clay, which are prone to compaction and the USDA characterizes as “poorly drained”. The poorly drained soils retain nutrients as the soils tend to hold water. While this makes grazing difficult, it also protects other surface water resources as runoff, and therefore nutrients, are contained. However, less than two days after heavy rain and with management of surface water after a significant rain event (diversion to a retention
area, etc.), the soils are observed to be dry enough to graze, even without a Kikuyu thatch. Drains may also be installed and used to remove non-nutrient laden water from the surface of these areas to reduce soil dry time and to restore grazing.

Once the farm is in operation, different operational conditions may be used to manage different areas of the farm based on soil types and drainage characteristics. Kikuyu itself doesn’t grow as effectively in inundated or overly-wet conditions, so the farm must be managed to make sure the drainage system is effective. Winter weather may dictate if certain areas or paddocks are used, and if nutrients are applied at all in specific areas.

The nursery used for the grass growth trials was intentionally located within an area characterized as "poorly drained" to test grass growth, nutrient application, and drainage. To date, operational and management decisions have allowed the nursery to perform well.

8.5 Soil Sampling Procedures

8.5.1 Soil Testing Frequency

Soils samples and testing will be performed at least annually, and more frequently as needed, during the farm operation, to assist with managing nutrient content of the soils. Soil samples will be collected from each field receiving manure as described in the University of Hawai‘i CTAHR Cooperative Extension Service publication (SCM-9).

Soil samples will be submitted for analysis to the University of Hawai‘i ADSC laboratory or another laboratory accepted in state-certified programs, the North American Proficiency Testing Program (Soil Science Society of America), or laboratories whose tests are accepted by the University of Hawai‘i CTAHR Cooperative Extension Service. All soil analyses will be conducted using methods approved by the University of Hawai‘i CTAHR.

Soil samples will be analyzed for pH and phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients, and other constituents pertinent to monitoring or amending the annual nutrient budget.
8.6 Manure Sampling

8.6.1 Manure Sampling Frequency

Manure samples will be collected at least quarterly, and more frequently as needed, from both (liquid and solid) effluent ponds, as well as the as-excreted manure, and the result of manure analyses will be used in determining land application rates of manure.

8.6.2 Liquid (Effluent and Slurry) Manure Sampling

Effluent and slurry samples will be taken at the same depth from five sites around the pond. Sub-samples will be mixed in a large, clean plastic container and analyzed while the contents are still swirling.

One pint of material will be collected in an unbreakable container that is no more than three quarters full and sent to the laboratory for analysis.

Samples will be transported in a cooler with ice packs, if necessary. Any stored samples will be refrigerated or frozen before being sent for analysis.

8.6.3 Solid Manure Sampling

Samples from five locations from around the settling pond will be taken at the same depth from which the slurry will be removed for application. Sub-samples will be combined in a clean plastic container and mixed thoroughly.

At least one pint of material will be collected in an unbreakable container, which is no more than three quarters full (a quart-sized freezer bag will be used).

Samples will be transported in a cooler with ice packs. Any stored samples will be refrigerated or frozen before being sent for analysis.
8.7 Forage Sampling

Kikuyu crop samples and testing will be performed at least quarterly, and more frequently as needed, to determine the nutrient content and nutritional value of the crop, both to manage the land application rates of manure and to manage the nutrition of the mature dairy cow.

8.8 Feed Management

A feed management plan will be developed and implemented utilizing the USDA NRCS Feed Management 592 Standard. This standard specifies certain criteria that must be followed and will become an essential component of the NMP. Feed management uses an assortment of tools, including regular analysis of feeds, milk, and manure, to more frequently review nutritional diet formulas and reduce the uncertainties of feed delivery. This process enables maintenance efficiency, improvement in milk production, and/or the improved health of livestock. Stabilizing nitrogen and phosphorus nutrient levels in the manure are also key objectives of HDF, to allow for more precise nutrient management within the farm.

The feed management plan will contain the following information and be developed by a certified animal nutritionist:

- Diets and feed management strategies based upon a benchmark manure sample
- A laboratory analysis completed for the various sources of animal feed (forage or commercial) used to formulate the diet to determine nutrient content for the ration
- Feed analysis conducted by an accepted accredited laboratory
- Adjustments to nutritional levels to improve or sustain livestock productivity
- Diet adjustments to reduce (or not exceed) nitrogen and phosphorus levels in as excreted manure
- Feed management records will be kept on site and reviewed annually along with manure analysis results
8.9 Water Quality Monitoring

HDF will implement a plan for water quality monitoring to assess baseline water quality and monitor water quality during operation, as well as assess the effectiveness of and to adjust HDF’s irrigation, nutrient management and conservation practices.

Monitoring Goals:

- Determine baseline water quality
- Monitor water quality during operation of the dairy
- Evaluate and adjust the frequency and timing of nutrient application and irrigation schedule
- Evaluate and adjust conservation practices
- Detect any potential problems early to allow adjustment of practices before the impacts are significant

8.9.1 Sampling Parameters

Parameters for measurement may include the following:

- Temperature
- Flow
- pH
- Dissolved oxygen
- Turbidity
- Total suspended solids
- Bacteria
- Pesticides
- Nitrogen (N), Phosphorus (P), Potassium (K)

A variety of actions could be taken to manage water quality and to prevent water quality issues from arising at the site. It is likely that one or more of the following actions would be considered and taken to address typical water quality concerns for this type of agricultural operation:

- Addition/modification to erosion and sediment controls
- Addition/modification to conservation measures
- Adjustment to irrigation application schedules
- Adjustment to effluent and sludge application schedules
Nutrient Balance Analysis
May 24, 2016

- Adjustment to nutrient application
- Adjustment to pasture rotation
- Changes to sampling routines, procedure or scheduling

8.10 Conclusion

This nutrient balance analysis is a very conservative analysis of all nutrients that will be produced on the farm. These conservative assumptions will be replaced with actual field collected data once the farm goes into operation. The Nutrient Management Plan(s) (reviewed by DOH for 699 mature dairy animals and to be prepared and reviewed for operations for 700 to up to 2,000 mature dairy animals) will be updated on an annual basis to reflect actual conditions of the farm, once the farm is in operation. The update will include an accounting of the acres in pasture, number of animals present, grass yields, and the overall dairy operation.

Fundamentally, HDF will be based on the most successful island dairy models in the world, and will utilize a sustainable, pasture-based, rotational-grazing system utilizing 21st century technology. The farm will be very different from conventional feedlot dairy operations. Manure nutrients produced on the farm will be utilized for forage crop growth, but balanced with crop nutrient need and commercial fertilizer applications to produce maximum forage yield.

One of the most important considerations in nutrient management planning for farms is the understanding that a NMP is an adaptive management tool. Some even describe it as a living, breathing document that is constantly monitored and updated as the conditions of the farm evolve. All nutrient application records, soil sampling records, forage sampling, water resource quality testing, and manure analysis records will be kept on site with the Nutrient Management Plan, for use by the farm operator to make informed nutrient management decisions. The results from annual soil testing, manure testing, forage testing, and water resource quality testing will then be used to update and inform the nutrient management process for HDF as the farm becomes established and operations mature.

As the current nutrient balance analysis indicates, with the 2,000 milking cow herd size, mass balance projections for HDF show the pound-per-month quantity of phosphorus will exceed the amount of phosphorus that the pasture crop requires for adequate growth.
Nutrient Balance Analysis
May 24, 2016

Nutrient management and mass balance analyses are dynamic and are influenced by the many different environmental variables that enter into nutrient cycle planning from grass yields, stocking density, manure nutrient content, soil nutrient content, and crop nutrient content. Several management options exist to keep phosphorus and other nutrients in balance, which may include and are not limited to planned additions of phosphorus to improve soil health, reduction in the carrying capacity of the farm to approximately 1,875 mature dairy cows from up to 2,000 mature dairy cows, or the expected increase in the grass yields from 16.3 tons of DM per acre per year to 20 tons of DM per acre per year (though an increase to 17.3 tons of DM per acre per year would be sufficient to bring phosphorus applications back into balance with crop demand and eliminate any phosphorus overage). Higher grass yields would demand additional phosphorus. Based on field trials, yields of 20 tons DM per acre per year are achievable after several years of pasture maturation. Should yields not increase as planned, the carrying capacity of the farm would be reduced. With reduced manure, phosphorus application levels would decrease and balance with the nutrient need of the grass. Nitrogen from commercial fertilizer would be required at both 1,875 and 2,000 milking cows.

HDF is committed to establishing a herd of up to 699 mature dairy cows, and demonstrating the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. In keeping with the NRCS Nutrient Management practice code and best practices, herd growth would be gradual, and the herd size will be dynamic and based upon the monitoring of nutrients in the manure, uptake by grass, nutrient content of soil, and total acres in pasture.

In accordance with the “Guidelines for Livestock Waste Management”, prepared by the University of Hawai‘i-Mānoa – CTAHR, and through consultations with the State of Hawai‘i Department of Health, NRCS District Conservationist, and the West Kaua‘i Soil and Water Conservation District, HDF has prepared this Nutrient Balance Analysis for its Environmental Impact Statement (EIS), stating the intended management methods and techniques which will be used to properly manage its wastewater systems and the nutrient balance of the farm, at a herd size from 699 to up to 2,000 mature dairy animals.
APPENDIX E

ESTIMATES OF THE POTENTIAL IMPACT ON GROUNDWATER AND SURFACE WATER BY HAWAII DAIRY FARMS IN Mahaulepu, Kauai

Tom Nance Water Resource Engineering
Estimates of the Potential Impact on Groundwater and Surface Water by Hawaii Dairy Farms in Mahaulepu, Kauai

Prepared for:
Group 70 International, Inc.
925 Bethel Street – 5th Floor
Honolulu, Hawaii 96813

Prepared by:
Tom Nance Water Resource Engineering
560 N. Nimitz Hwy. - Suite 213
Honolulu, Hawaii 96817

April 2016
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Groundwater Occurrence at Mahaulepu</td>
<td></td>
</tr>
<tr>
<td>Overview of the Two Groundwater Bodies in Mahaulepu Valley</td>
<td>1</td>
</tr>
<tr>
<td>Water Levels and Quality of Groundwater in the Alluvium</td>
<td>3</td>
</tr>
<tr>
<td>Water Levels</td>
<td>3</td>
</tr>
<tr>
<td>Water Quality</td>
<td>3</td>
</tr>
<tr>
<td>Wells Drawing from the Aquifer in the Waimea Volcanics</td>
<td>3</td>
</tr>
<tr>
<td>Available Information on the Well 14 Battery</td>
<td>3</td>
</tr>
<tr>
<td>Information on the Kauai Department of Water (DOW) Wells</td>
<td>13</td>
</tr>
<tr>
<td>Possible Hydrologic Connection Between the Groundwater Bodies in the Alluvium and at Depth in the Unweathered Waimea Volcanics</td>
<td>13</td>
</tr>
<tr>
<td>Driller’s logs of the Well 14 Battery</td>
<td>14</td>
</tr>
<tr>
<td>Comparative Salinity and Temperature Profiles</td>
<td>14</td>
</tr>
<tr>
<td>Pump Test of the Middle Well of the Well 14 Battery</td>
<td>14</td>
</tr>
<tr>
<td>Response of Groundwater in the Alluvium to Pumping of DOW’s Koloa Well F</td>
<td>26</td>
</tr>
<tr>
<td>Surface Water Occurrence at Mahaulepu</td>
<td></td>
</tr>
<tr>
<td>Surface Water Courses and Drainage Channels</td>
<td>26</td>
</tr>
<tr>
<td>Other Perennial Surface Water Features Within or Near to the HDF Property</td>
<td>31</td>
</tr>
<tr>
<td>Mahaulepu Reservoir</td>
<td>31</td>
</tr>
<tr>
<td>Perennial Sump at the Well 14 Battery</td>
<td>31</td>
</tr>
<tr>
<td>Estimates of Potential Impacts to Groundwater and Surface Water</td>
<td></td>
</tr>
<tr>
<td>Identification of the Major Potential Impacts to Consider</td>
<td>34</td>
</tr>
<tr>
<td>Expected Use of Groundwater and Surface Water by HDF</td>
<td>34</td>
</tr>
<tr>
<td>Use of Groundwater</td>
<td>34</td>
</tr>
<tr>
<td>Use of Water from Waiga Reservoir to Irrigate the Grass</td>
<td>34</td>
</tr>
<tr>
<td>Potential Increases of Nitrogen and Phosphorus Leaving the HDF Site</td>
<td>38</td>
</tr>
<tr>
<td>Methodology</td>
<td>38</td>
</tr>
<tr>
<td>Existing Groundwater Flow and Nitrogen and Phosphorus Loading</td>
<td>38</td>
</tr>
<tr>
<td>Existing Surface Water Flow and Nitrogen and Phosphorus Loading</td>
<td>39</td>
</tr>
<tr>
<td>Potential Nutrient Additions by Hawaii Dairy Farms</td>
<td>39</td>
</tr>
<tr>
<td>Quantification of Circulating Nutrient Amounts in the Dairy Operation</td>
<td>39</td>
</tr>
<tr>
<td>Potential Losses of Nitrogen and Phosphorus to Surface and Groundwater</td>
<td>41</td>
</tr>
</tbody>
</table>

## List of Figures

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Location of Hawaii Dairy Farms in Mahaulepu, Kauai</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Recorded Water Level in the HDF-1 Well</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Recorded Water Level in the HDF-2 Well</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>Recorded Water Level in the HDF-3 Well</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>Recorded Water Level in the HDF-4 Well</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>Water Level Response in HDF-2 to Rainfall Over the November 19 to December 28, 2015 Period</td>
<td>9</td>
</tr>
</tbody>
</table>
# Table of Contents

## List of Figures

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Water Level Response in HDF-3 to Rainfall Over the November 19 to December 28, 2015 Period</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>Conductivity and Temperature Profile of the Water Column of the Westernmost Well of the Well 14 Battery Made on November 6, 2014</td>
<td>16</td>
</tr>
<tr>
<td>9</td>
<td>Conductivity and Temperature Profile of the HDF-1 Monitor Well July 9, 2015</td>
<td>17</td>
</tr>
<tr>
<td>10</td>
<td>Conductivity and Temperature Profile of the HDF-2 Monitor Well July 9, 2015</td>
<td>18</td>
</tr>
<tr>
<td>11</td>
<td>Conductivity and Temperature Profile of the HDF-3 Monitor Well July 9, 2015</td>
<td>19</td>
</tr>
<tr>
<td>12</td>
<td>Conductivity and Temperature Profile of the HDF-4 Monitor Well July 9, 2015</td>
<td>20</td>
</tr>
<tr>
<td>13</td>
<td>Pumping Rates and Water Level Response in the Pumped Well During the March 17, 2015 Test of the Well 14 Battery</td>
<td>21</td>
</tr>
<tr>
<td>14</td>
<td>Semilog Plot of Drawdown and Recovery in the Pumped Well During and Following the March 17, 2015 Pump Test</td>
<td>22</td>
</tr>
<tr>
<td>15</td>
<td>Water Level Responses in the Two Other Well 14 Battery Wells During the March 17, 2015 Pump Test</td>
<td>23</td>
</tr>
<tr>
<td>16</td>
<td>Semilog Plot of Drawdown and Recovery in the Well to the East of the Pumped Well During the March 17, 2015 Pump Test</td>
<td>24</td>
</tr>
<tr>
<td>17</td>
<td>Semilog Plot of Drawdown and Recovery in the Well to the West of the Pumped Well During the March 17, 2015 Pump Test</td>
<td>25</td>
</tr>
<tr>
<td>18</td>
<td>Water Level in the HDF-1 Monitor Well During and Following the Pump Test of the Well 14 Battery on March 17, 2015</td>
<td>27</td>
</tr>
<tr>
<td>19</td>
<td>Water Level in the HDF-2 Monitor Well During and Following the Pump Test of the Well 14 Battery on March 17, 2015</td>
<td>28</td>
</tr>
<tr>
<td>20</td>
<td>Recorded Water Levels in DOW’s Koloa Well F and the HDF-4 Monitor Well</td>
<td>29</td>
</tr>
<tr>
<td>21</td>
<td>Comparison of the Water Levels in Koloa Well F and HDF-4</td>
<td>30</td>
</tr>
<tr>
<td>22</td>
<td>Locations of the 12 Surface Water Sampling Sites</td>
<td>33</td>
</tr>
<tr>
<td>23</td>
<td>December 2014 Pump Test of the Perennial Sump at the Well 14 Battery</td>
<td>35</td>
</tr>
<tr>
<td>24</td>
<td>Water Level in the Nearby Sump During and Following the Well 14 Battery Pump Test</td>
<td>36</td>
</tr>
<tr>
<td>25</td>
<td>Frequency of Occurrence of Daily Rainfall Amounts at Mahaulepu Station 94.1 (January 1984 thru December 2013 Data)</td>
<td>44</td>
</tr>
</tbody>
</table>

## List of Tables

<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Elevations and Depths of the Four HDF Monitor Wells</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Quality of Water Samples Taken from the Monitor Wells on the Hawaii Dairy Farms Site</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>Available Information on Wells in and Near to Mahaulepu, Kauai</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>Driller’s Log of Wells 5425-11 to -14 in the Well 14 Battery</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>Results of Surface Water Sampling on and Near to the Hawaii Dairy Farms Site</td>
<td>32</td>
</tr>
<tr>
<td>6</td>
<td>Approximation of HDF’s Monthly and Annual Average Irrigation Rate</td>
<td>37</td>
</tr>
<tr>
<td>7</td>
<td>Nutrient Balance Calculations for 699 and 2000 Cows</td>
<td>40</td>
</tr>
<tr>
<td>8</td>
<td>Annual Nitrogen and Phosphorus Supplements Required to Ground Kikuyu Grass on 470 Acres of Pasture</td>
<td>42</td>
</tr>
<tr>
<td>9</td>
<td>UIC Permitted Disposal Wells in the Koloa-Poipu Area</td>
<td>46</td>
</tr>
</tbody>
</table>
INTRODUCTION

This report presents estimates of the potential impact of the proposed Hawaii Dairy Farms (HDF) on groundwater and surface water in Mahaulepu on Kauai. The 557 acre project site will be developed on former sugarcane lands in Mahaulepu Valley. Initially, HDF will have a herd of up to 699 cows. Depending on the success of the initial herd size, expansion of the herd up to the carrying capacity of the site may occur. That carrying capacity is presently thought to be 2000 cows. In the evaluation of impacts in this report, both herd sizes – 699 and 2000 cows – are evaluated.

This report begins with descriptions of groundwater and surface water occurrence within and around the HDF site, including results from the four monitor wells that have been drilled on the site and the results of surface and ground water quality sampling. After these descriptions, estimates of the project’s potential impact on water resources are presented. These estimates draw heavily from two reports: (1) “Nutrient Balance Analysis for Hawaii Dairy Farms” by Group 70 and Red Barn Consulting dated March 2016; and (2) “Hawaii Dairy Farms Drainage Memorandum” by Group 70 dated August 2015.

GROUNDWATER OCCURRENCE IN MAHAULEPU

Overview of the Two Groundwater Bodies in Mahaulepu Valley

Groundwater in Mahaulepu Valley occurs in two different geologic formations. The aquifer of highest value and use resides in the unweathered Waimea volcanics which are exposed in the valley walls and buried beneath the thick alluvium which covers the valley floor. All 14 wells of the Grove Farm sugarcane plantation’s Well 14 Battery were drilled through the alluvium into the volcanics at depth. The Kauai Department of Water’s (DOW’s) Koloa Well F (State No. 5425-15) taps into the volcanics of the west valley wall. Two other DOW wells, Koloa C and D (Nos. 5426-04 and -05), tap into the volcanics just outside of the valley (refer to Figure 1). At present, static water levels in all of the wells that tap groundwater in the volcanics stand between 22 and 26 feet above sea level and all of the wells produce water that is of potable quality.

The other groundwater body in Mahaulepu exists in the dark brown to black silty clay and clayey silt that comprise the thick alluvial blanket that covers the valley floor. The permeability of the alluvial mud is highly variable and orders of magnitude less than the permeability of the unweathered Waimea volcanics. Four monitor wells on the HDF site have been drilled into the alluvium (their locations are shown on Figure 1). Water levels in these wells vary from about 80 feet above sea level toward the inland end of the HDF site (wells HDF-1 and HDF-2) to about 50 feet at the makai end of the HDF site (HDF-3). These levels are 30 to more than 50 feet higher than the groundwater levels in the unweathered volcanics.
Figure 1
Location of Hawaii Dairy Farms in Mahaulepu, Kauai

Scale: 1" = 1500'
Water Levels and Quality of Groundwater in the Alluvium

Water Levels. Elevations and depths of the four HDF monitor wells are listed in Table 1. Water levels of the four HDF monitor wells were recorded over the May 13 to 20, 2015 period to establish the water levels of groundwater in the alluvium and to depict its mauka-to-makai gradient. Results are shown on Figures 2 through 5. Toward the inland end of the HDF site at the HDF-1 and -2 wells, groundwater levels in the alluvium are about 80 feet above mean sea level (MSL). The level drops rapidly going makai, to 68 feet (MSL) at HDF-4 and to 49 feet at HDF-3. In general, the movement of groundwater in the alluvium is from mauka to makai with ultimate discharge into the marine environment. The gradient is on the order of 35 feet per mile. This is far greater than is typical in Hawaii for groundwater in permeable, unweathered volcanics.

The low permeability and low effective storage of the mud that comprises the alluvial blanket across the valley floor is illustrated by the water level recordings of the HDF-2 and HDF-3 monitor wells over the November 19 to December 28, 2015 period. On November 21st, 5.95 inches of rainfall as measured by the HDF onsite rain gage produced a 2.63-foot rise in HDF-2 (Figure 6) and a 3.91-foot rise in HDF-3 (Figure 7). Over this same period, there was essentially no change in the water level in the Well 14 Battery wells which tap the aquifer in the volcanics at depth below the alluvium.

Water Quality. Table 2 presents the water quality results of two sample sets from the monitor wells taken in May and July 2015, with sampling at two depths in each well. In general, groundwater in the alluvium is fresh (salinities on the order of 0.18 to 0.47 PPT). However, the nitrogen and silica levels are much lower than typical for groundwater in Hawaiian basalt. Typical nitrogen levels in Hawaiian basalt aquifers are 70 to 80 µM. Typical silica levels are 700 µM. For the groundwater in the alluvium sampled from the monitor wells, nitrogen and silica are about half the levels typical in basalt aquifer wells.

Wells Drawing from the Aquifer in the Waimea Volcanics

Available Information on the Well 14 Battery. The Well 14 Battery in Mahaulepu consists of 14 wells which were drilled through the alluvial mud to tap the aquifer in the volcanics at depth (refer to Table 3). The first 10 wells (State Nos. 5425-01 to -10) were drilled in the 1897 to 1901 time period. All of the well depths were between 300 to 303 feet below the existing ground at a reported elevation of 85 feet. All were outfitted with 12-inch solid steel casing to below ground depths between 210 to 242 feet. Lengths of open hole below the solid casing were from 61 to 92 feet, equivalent to between 157 and 218 feet below sea level.
Table 1
Elevations and Depths of the Four HDF Monitor Wells

<table>
<thead>
<tr>
<th>Monitor Well Name</th>
<th>HDF-1</th>
<th>HDF-2</th>
<th>HDF-3</th>
<th>HDF-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approximate Ground Elevation (Feet MSL)</td>
<td>85</td>
<td>92</td>
<td>57</td>
<td>92</td>
</tr>
<tr>
<td>Measuring Point Elevation (Feet MSL)</td>
<td>88.16</td>
<td>94.39</td>
<td>60.74</td>
<td>95.47</td>
</tr>
<tr>
<td>Well Depth (Feet)</td>
<td>101.6</td>
<td>100.8</td>
<td>51.3</td>
<td>57.7</td>
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<tr>
<td>Elevation at Bottom (Feet MSL)</td>
<td>-13.4</td>
<td>-6.4</td>
<td>9.4</td>
<td>37.8</td>
</tr>
</tbody>
</table>

Notes:
1. Measuring point for all wells is the top of their 4-inch PVC casings.
2. Well depths are measured from the tops of the 4-inch PVC well casings.
Figure 2. Recorded Water Level in the HDF-1 Well

Water Level in HDF-1 (Feet MSL) vs. Barometric Pressure (Equivalent Feet of Water)

Day and Time in May 2015

- Water Level in HDF-1
- Recorded Barometric Pressure
Figure 3. Recorded Water Level in the HDF-2 Well
Figure 4. Recorded Water Level in the HDF-3 Well

Water Level in HDF-3

Recorded Barometric Pressure

Day and Time in May 2015

Water Level in HDF-3 (Feet MSL)

Barometric Pressure (Equivalent Feet of Water)
Figure 5. Recorded Water Level in the HDF-4 Well

- Water Level in HDF-4
- Recorded Barometric Pressure
Figure 6. Water Level Response in HDF-2 to Rainfall Over the November 19 to December 28, 2015 Period
Figure 7. Water Level Response in HDF-3 to Rainfall Over the November 19 to December 28, 2015 Period
<table>
<thead>
<tr>
<th>Monitor Well No.</th>
<th>Sample Date</th>
<th>Depth into Water (Feet)</th>
<th>Forms of Nitrogen</th>
<th>Forms of Phosphorus</th>
<th>Silica</th>
<th>Turbidity</th>
<th>Salinity (p.p.t)</th>
<th>pH (pH Units)</th>
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</thead>
<tbody>
<tr>
<td>HDF-1</td>
<td>5/8/2015</td>
<td>5</td>
<td>21.23 (µM)</td>
<td>0.63 (µM)</td>
<td>437</td>
<td>0.99</td>
<td>0.257</td>
<td>6.315</td>
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<tr>
<td></td>
<td>7/9/2015</td>
<td>5</td>
<td>10.24 (µM)</td>
<td>0.10 (µM)</td>
<td>360</td>
<td>1.31</td>
<td>0.281</td>
<td>5.938</td>
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<td></td>
<td>5/8/2015</td>
<td>50</td>
<td>28.18 (µM)</td>
<td>0.73 (µM)</td>
<td>441</td>
<td>1.98</td>
<td>0.241</td>
<td>6.273</td>
</tr>
<tr>
<td></td>
<td>7/9/2015</td>
<td>50</td>
<td>29.29 (µM)</td>
<td>0.13 (µM)</td>
<td>383</td>
<td>0.95</td>
<td>0.249</td>
<td>6.084</td>
</tr>
<tr>
<td>HDF-2</td>
<td>5/8/2015</td>
<td>5</td>
<td>19.50 (µM)</td>
<td>0.90 (µM)</td>
<td>312</td>
<td>2.32</td>
<td>0.192</td>
<td>6.464</td>
</tr>
<tr>
<td></td>
<td>7/9/2015</td>
<td>5</td>
<td>21.79 (µM)</td>
<td>0.06 (µM)</td>
<td>294</td>
<td>4.43</td>
<td>0.191</td>
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<tr>
<td></td>
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<td>13.43 (µM)</td>
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<td>322</td>
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<td>0.184</td>
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<td>55</td>
<td>26.05 (µM)</td>
<td>0.14 (µM)</td>
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<td>11.2</td>
<td>0.185</td>
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<td>5/8/2015</td>
<td>5</td>
<td>11.90 (µM)</td>
<td>1.10 (µM)</td>
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<td>3.02</td>
<td>0.391</td>
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<td>1.92 (µM)</td>
<td>0.30 (µM)</td>
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<td>25</td>
<td>14.98 (µM)</td>
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<td>25</td>
<td>13.90 (µM)</td>
<td>1.03 (µM)</td>
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<td>0.357</td>
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<td>15.8 (µM)</td>
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<td>State Number</td>
<td>Well Name</td>
<td>Year Drilled</td>
<td>Casing Diam (Inches)</td>
<td>Ground Elev. (Feet MSL)</td>
<td>Total Depth (Feet)</td>
<td>Elev. At Bottom of Well (Feet MSL)</td>
<td>Length of Solid Casing (Feet)</td>
<td>Elev. At Bottom of Slotted Casing (Feet)</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------</td>
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<td>Well 1</td>
<td>1897</td>
<td>12</td>
<td>85</td>
<td>303</td>
<td>-218</td>
<td>242</td>
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<td>5425-02</td>
<td>Well 2</td>
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<td>220</td>
<td>-135</td>
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<td>5425-03</td>
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<td>5425-04</td>
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<td>210</td>
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<td>-130</td>
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<td>-216</td>
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<td>5425-13</td>
<td>Well 13</td>
<td>1927</td>
<td>12</td>
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<td>-224</td>
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<td>5425-14</td>
<td>Well 14</td>
<td>1928</td>
<td>12</td>
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<td>532</td>
<td>-447</td>
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<td>-230</td>
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<tr>
<td>5425-15</td>
<td>Koloa F</td>
<td>1998</td>
<td>16</td>
<td>130</td>
<td>377</td>
<td>-247</td>
<td>123</td>
<td>7</td>
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<td>5426-04</td>
<td>Koloa C</td>
<td>1977</td>
<td>16</td>
<td>157</td>
<td>393</td>
<td>-236</td>
<td>293</td>
<td>-136</td>
</tr>
<tr>
<td>5426-05</td>
<td>Koloa D</td>
<td>1981</td>
<td>16</td>
<td>222</td>
<td>420</td>
<td>-198</td>
<td>320</td>
<td>-98</td>
</tr>
</tbody>
</table>

Note: Information from the State Commission on Water Resource Management's Groundwater Index
The original 10 wells were linked together by a manifold system about 50 feet below ground. Steam-driven pumps in a pit delivered water from the manifolded wells to the furrow-irrigated sugarcane fields. Difficulty with the stability of the walls of the pump sump led to a major modification of the facility in 1927 to 1928. Four new wells were drilled (Nos. 5425-11 to -14) and the original 10 wells, connecting subsurface manifold, and pump sump were abandoned in place. No plans or drawings could be located that depict the portions of the system that were abandoned. There is a perennial water feature in the near vicinity which is likely to be the location of the abandoned pump sump.

The four new wells that were added to the Well 14 Battery in 1927 to 1928 were drilled deeper than the original 10 wells (to below ground depths of 505 to 532 feet) and also had 12-inch solid casing installed to greater depths (245 to 319 feet). Only three of these four wells can be found today. All three of these wells at one time were outfitted with oil lubricated line shaft turbine pumps, but only one of the three also had a motor when work on this assessment was initiated in 2014. The pumps were still in the other two wells but their motors had been removed. According to recollections of plantation personnel, only the well with the motor was in use for the last 20 or so years of the plantation’s existence (it is the westernmost of the three wells and adjacent to what is believed to be the abandoned pump sump for the first 10 wells). Its pump and motor reportedly delivered about 3.0 MGD. The depths of three wells were measured to try to correlate these with historic records. However, the measured depths do not correlate with the historic records (from west to east, the measured depths were 506.1, 494.3, and 500.8 feet).

Information on the Kauai Department of Water (DOW) Wells. DOW has three wells in the near vicinity of the HDF site (refer to Figure 1 and the bottom of Table 2). The closest is Koloa Well F (No. 5425-15). It is located in the west valley wall and is about 580 feet from the HDF’s western boundary. The other two wells, known as Koloa Wells C and D, are located at the foot of the valley’s west ridge and are 1170 and 2140 feet, respectively, from the nearest point of the HDF site. All three wells are outfitted with 1200 GPM pumps. Depths of these wells are notable, ranging from 247 feet below sea level for Koloa Well F to 198 feet below sea level for Koloa Well D. All three were drilled through weathered volcanics (saprolite) to reach the unweathered, water bearing volcanics.

Possible Hydrologic Connection Between the Groundwater Bodies in the Alluvium and at Depth in the Unweathered Waimea Volcanics

Since groundwater levels in the alluvium are 30 to more than 50 feet higher than the piezometric head of groundwater confined in the underlying and unweathered volcanics at depth below the alluvium, it is reasonable to question whether groundwater in the alluvium discharges into the lower, confined groundwater body in the unweathered volcanics. Several types of information are available to assess this possibility: (1) logs of the last four wells drilled of the Well 14 Battery which fully penetrated the alluvium to the unweathered volcanics at depth; (2) contrasting salinity and temperatures of groundwater in the two groundwater bodies; (3) results of a pump test of one of the Well 14 Battery wells drawing water from the
unweathered volcanics at depth with monitoring of the possible response in groundwater in the alluvium; and (4) measured responses of groundwater in the alluvium to operation of the Koloa Well F pump. Each of these is described in the sections following. All indicate that there is complete hydrologic separation of the two groundwater bodies.

Driller’s logs of the Well 14 Battery Wells. Driller’s logs for the last four wells of the Well 14 Battery are in the 1960 Bulletin 13 of the Hawaii Division of Hydrography (pages 154 to 156) and are reproduced here as Table 4. Sticky red, brown, and purple clay layers are logged from depths of 75 to 300 feet. These layers are essentially impermeable and function as an aquiclude to separate the shallow groundwater in the alluvium from the confined groundwater in the underlying volcanics.

Comparative Salinity and Temperature Profiles. Figure 8 is a conductivity and temperature profile through one of the Well 14 Battery of wells, very likely No. 5425-14 based on the depth of its solid casing. Groundwater in the confined aquifer at depth below the solid casing has an essentially uniform conductivity of 335 µS/cm and temperature of 72.0°F. Conductivity and temperature profiles in the monitor wells are shown on Figures 9 to 12. In contrast to the water in the unweathered volcanics, water in the alluvium is two to six degrees warmer and its conductivity is significantly different, being both fresher (in HDF-2) and significantly more saline (in HDF-1, HDF-3, and HDF-4) than in the groundwater in the volcanics at depth. The source of recharge to groundwater in the alluvium is percolation of rainfall directly on to the alluvium and surface runoff from the upland areas, both of which provide exceptionally fresh water. The source of the much higher salinity water at depth in the HDF-3 and HDF-4 wells is not known. In any event, there are significant salinity and temperature differences of the water in both aquifers which suggest that discharge of water from the alluvium into the volcanics at depth is not occurring.

Pump Test of the Middle Well of the Well 14 Battery. On March 17, 2015, the middle of the three remaining wells of the Well 14 Battery was pumped tested for 10 hours to see if this would produce a response in groundwater in the alluvium. Water level recorders were installed in the pumped well, in the two other Well 14 Battery wells, and in the HDF-1 and HDF-2 monitor wells. All water levels were recorded at 30-second intervals.

Pumping rates and water level response in the pumped well are depicted on Figure 13. Its drawdown at the end of the test was quite substantial (17.1 feet at a pumping rate of 825 GPM) and the drawdown and recovery had a time-dependent component typical of a confined aquifer (Figure 14). Drawdowns in the two adjacent wells of the Well 14 Battery were essentially instantaneous (in the same 30-second recording interval) and were also quite substantial (5.3 and 3.7 feet in the wells to the east and west as shown on Figure 15). These wells are 96 and 67 feet from the pumped well, respectively. They also exhibited similar time-dependent drawdowns and recoveries (Figures 16 and 17).
Table 4. Driller’s Log of Wells 5425-11 to -14 in the Well 14 Battery

<table>
<thead>
<tr>
<th>Well 14K</th>
<th>Driller’s log</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clay</strong></td>
<td>0-60</td>
</tr>
<tr>
<td>Brown and blue lava, Struck water at 64 ft., which rose to 51 ft. below ground. Can bail water down</td>
<td>60-69</td>
</tr>
<tr>
<td>Red clay, cubing and sticky</td>
<td>69-85</td>
</tr>
<tr>
<td>Red, blue, and brown clay</td>
<td>85-120</td>
</tr>
<tr>
<td>Purple clay, sticks</td>
<td>120-165</td>
</tr>
<tr>
<td>Brown sandy clay</td>
<td>165-195</td>
</tr>
<tr>
<td>Rotten rock and rubble. Some water at about 195 ft. standing about 26 ft. above sea level, but could bail it down to below sea level</td>
<td>195-215</td>
</tr>
<tr>
<td>Porous lava</td>
<td>216-248</td>
</tr>
<tr>
<td>Hard blue stone</td>
<td>249-261</td>
</tr>
<tr>
<td><strong>Depth</strong></td>
<td><strong>Depth</strong></td>
</tr>
<tr>
<td>(ft.)</td>
<td>(ft.)</td>
</tr>
<tr>
<td>Blue and red porous lava, Water at about same level to 320 ft., where it rose to 30 ft. above sea level. Does not bail down</td>
<td>361-382</td>
</tr>
<tr>
<td>Hard lava and blue stone</td>
<td>392-396</td>
</tr>
<tr>
<td>Porous lava</td>
<td>396-398</td>
</tr>
<tr>
<td>Hard lava and blue porous lava</td>
<td>398-400</td>
</tr>
<tr>
<td>Blue and red porous lava</td>
<td>396-400</td>
</tr>
<tr>
<td>Blue and red porous lava with small streaks of blue stone. At 330 ft. water stands 2 ft. above sea level</td>
<td>385-475</td>
</tr>
<tr>
<td>Hard brown lava full of olivines</td>
<td>475-483</td>
</tr>
<tr>
<td>Red porous lava and volcanic ash and brown burst porcelain</td>
<td>488-488</td>
</tr>
<tr>
<td>Blue and brown red lava; blue and brown lava with olivines and very hard.</td>
<td>488-506</td>
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</table>

<table>
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<tr>
<th>Well 14L</th>
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<tbody>
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<td>(ft.)</td>
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<td>Red, blue, and brown clay</td>
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<tr>
<td>Hard blue lava</td>
<td>54-60</td>
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<tr>
<td>Brown and grey rotten lava</td>
<td>60-63</td>
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<tr>
<td>Hard blue lava</td>
<td>63-84</td>
</tr>
<tr>
<td>Rotten brown lava, some black sand</td>
<td>64-86</td>
</tr>
<tr>
<td>Hard blue lava</td>
<td>86-97</td>
</tr>
<tr>
<td>Reddish brown clay</td>
<td>97-99</td>
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<tr>
<td>Red, blue, and brown clay</td>
<td>99-114</td>
</tr>
<tr>
<td>Purple and brown clay</td>
<td>114-159</td>
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<td>Greenish brown clay, sandy</td>
<td>159-194</td>
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<td>Brown clay and rotten rock</td>
<td>194-216</td>
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<tr>
<td>Blue and brown lava, hard</td>
<td>216-245</td>
</tr>
<tr>
<td>Brown clay and rotten rock</td>
<td>245-252</td>
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<td>Blue and brown lava</td>
<td>253-264</td>
</tr>
<tr>
<td>Rotten rock</td>
<td>264-292</td>
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<tr>
<td>Red, blue, and brown porous lava, some hard streaks, water</td>
<td>292-319</td>
</tr>
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</table>

<table>
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<tr>
<th>Well 14M</th>
<th>Depth</th>
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<tbody>
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<td><strong>Depth</strong></td>
<td>(ft.)</td>
</tr>
<tr>
<td>Red and blue clay</td>
<td>0-43</td>
</tr>
<tr>
<td>Blue clay</td>
<td>43-62</td>
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<tr>
<td>Ruddy and brown clay. At 72 ft. brown sandy mud thin enough to bail rose to 44 ft.</td>
<td>63-72</td>
</tr>
<tr>
<td>Hard lava, blue and brown clay</td>
<td>72-76</td>
</tr>
<tr>
<td>Reddish brown clay</td>
<td>75-97</td>
</tr>
<tr>
<td>Brown and purple sandy clay</td>
<td>97-128</td>
</tr>
<tr>
<td>Light brown clay, sticky</td>
<td>128-148</td>
</tr>
<tr>
<td>Chocolate brown clay, sticky</td>
<td>148-163</td>
</tr>
<tr>
<td>Greenish brown clay, very tough and sticky</td>
<td>163-216</td>
</tr>
<tr>
<td>Blue clay and rotten rock</td>
<td>216-237</td>
</tr>
<tr>
<td>Volcanic ash, cinders, and fine sand, all colors</td>
<td>237-283</td>
</tr>
<tr>
<td>Hard red lava. Water stands 25 ft. above sea level</td>
<td>283-311</td>
</tr>
<tr>
<td>Hard brown lava</td>
<td>311-326</td>
</tr>
<tr>
<td>Hard blue rock. At 326 ft. water stands 77 ft. above sea level.</td>
<td>326-330</td>
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<table>
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<tr>
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<tbody>
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<td>Red, blue, and brown clay</td>
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<td>Lava</td>
<td>73-75</td>
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<td>Reddish brown clay</td>
<td>75-129</td>
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<tr>
<td>Purple and brown clay</td>
<td>129-204</td>
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<td>Brown clay and rotten rock</td>
<td>205-230</td>
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<tr>
<td>Red lava</td>
<td>230-232</td>
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<tr>
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Figure 8. Conductivity and Temperature Profile of the Water Column of the Westernmost Well of the Well 14 Battery Made on November 6, 2014

- Likely Bottom of Casing
- Water Trapped in the Solid Casing
- Open Hole Portion of the Well; Water Representative of Ground Water in the Waimea Volcanics at Depth
- 320 Feet Below Ground
Figure 9. Conductivity and Temperature Profile of the HDF-1 Monitor Well July 9, 2015
Figure 10. Conductivity and Temperature Profile of the HDF-2 Monitor Well July 9, 2015
Figure 11. Conductivity and Temperature Profile of the HDF-3 Monitor Well July 9, 2015
Figure 12. Conductivity and Temperature Profile of the HDF-4 Monitor Well July 9, 2015
Figure 13. Pumping Rates and Water Level Response in the Pumped Well During the March 17, 2015 Test of the Well 14 Battery
Figure 14. Semilog Plot of Drawdown and Recovery in the Pumped Well During and Following the March 17, 2015 Pump Test

Minutes Since Pumping Started Divided by Minutes Since Pumping Stopped

- Drawdown
- Recovery

Drawdown (Feet)

Minutes Since Pumping Started

400 GPM
600 GPM
825 GPM
Figure 16. Semilog Plot of Drawdown and Recovery in the Well to the East of the Pumped Well During the March 17, 2015 Pump Test

Minutes Since Pumping Started Divided by Minutes Since Pumping Stopped
Figure 17. Semilog Plot of Drawdown and Recovery in the Well to the West of the Pumped Well During the March 17, 2015 Pump Test

Minutes Since Pumping Started Divided by Minutes Since Pumping Stopped

Drawdown

Recovery

400 GPM

600 GPM

825 GPM

Drawdown

Recovery

Drawdown

Recovery
Figure 17. Semilog Plot of Drawdown and Recovery in the Well to the West of the Pumped Well During the March 17, 2015 Pump Test

Minutes Since Pumping Started Divided by Minutes Since Pumping Stopped

Drawdown

Recovery

400 GPM
600 GPM
825 GPM

Minutes Since Pumping Started
Water levels recorded in the two monitor wells are shown on Figures 18 and 19. The HDF-1 well is 190 feet to the east of the deep well used for the pump test of the Well 14 Battery. It had an actual build up (rather than drawdown) of 0.05 feet during the pump test, the result of disposal of the pumped water on the ground surface (the clay and silt of the alluvium is compressible, hence the build up). There was otherwise no response to the pumping. The HDF-2 well is 1300 feet to the east of the pumped well of the Well 14 Battery. No response to pumping occurred.

Response of Groundwater in the Alluvium to Pumping of DOW’s Koloa Well F. Recorders were installed in all four of the HDF monitor wells and in DOW’s Koloa Well F for the 7-day period from May 13 to 20, 2015. The objective was to see if operation of the 1200 GPM pump in Koloa Well F creates an identifiable response in the groundwater in the alluvium. If a response were to occur, it would be most easily identified in the monitor well nearest to Koloa Well F, the HDF-4 well which is 630 feet from Koloa Well F. Figure 20 compares the water level in Koloa Well F with that in HDF-4 at the same vertical scale. Figure 21 shows this comparison with an expanded vertical scale for HDF-4 and over a shorter, 2-day period. If a response were to occur, it would most likely be as a pressure pulse arriving at HDF-4 several minutes following a pump start and/or stop of Koloa Well F. No such response occurred.

SURFACE WATER OCCURRENCE AT MAHAULEPU

Surface Water Courses and Drainage Channels

The main surface water course which crosses the HDF site is not named on the USGS quadrangle map. At its mauka end above the HDF site, it is a relatively steep, naturally occurring water course with several small tributaries. Across the HDF site and for some distance further makai, the stream channel is manmade to facilitate former sugarcane cultivation. Toward the inland end of the HDF site in the vicinity of the HDF-1 and HDF-2 monitor wells, the groundwater level in the alluvium fluctuates with seasonal rainfall-recharge. In wetter periods, the groundwater level rises above the invert elevation of the manmade channels and a modest amount of discharge of groundwater from the alluvium into the drainage channel occurs. Toward the makai end of the HDF site in the vicinity of HDF-3, the groundwater level in the alluvium is substantially below the manmade channel invert, meaning that groundwater discharge from the alluvium into the channels does not occur at the makai end of the HDF site.

There are a number of other drainage channels which cross the HDF site, all of which were constructed to facilitate sugarcane cultivation. These convey surface runoff originating offsite and crossing the HDF site to ultimate discharge at the shoreline. It should also be noted that the Waïta Reservoir Ditch circumnavigated the Mahaulepu Valley floor, bringing water into the Mahaulepu Reservoir and also providing direct delivery for furrow irrigation. This ditch apparently fell out of use when the method of irrigation was converted from furrow to drip. From that time forward, water from the Well 14 Battery was apparently the sole source of irrigation for sugarcane in the valley. In the post-plantation
Figure 18. Water Level in the HDF-1 Monitor Well During and Following the Pump Test of the Well 14 Battery on March 17, 2015
Figure 19. Water Level in the HDF-2 Monitor Well During and Following the Pump Test of the Well 14 Battery on March 17, 2015
Figure 20. Recorded Water Levels in DOW's Koloa Well F and the HDF-4 Monitor Well
Figure 21. Comparison of the Water Levels in Koloa Well F and HDF-4
period (from about 1999), water from Wa`ia has been delivered to Mahaulepu via a 12-inch pipeline. In addition to irrigation of about 70 acres of Kikuyu grass at the mauka end of the HDF site, the pipeline supplies a taro farm, banana cultivation (near DOW’s Koloa Well F), a quarry (on the east side of the valley), and agriculture makai of the HDF site.

Table 5 is a compilation of five surface water sample sets taken at the 12 sample sites above, within, and makai of the HDF site as shown on Figure 22. Sites 1 and 2 are above the HDF project area, sites 3 through 10 are within the HDF site, and sites 11 and 12 are downstream of the HDF site. Depending on location, the samples reflect various components of surface runoff from offsite, Wa`ia Reservoir water brought in for irrigation use, and seepage of shallow groundwater from the alluvium into the drainage courses. Other than all of the samples being of very low salinity, there is significant variability at most sites and from site to site.

Other Perennial Surface Water Features Within or Near to the HDF Site

There are two perennial surface water features in Mahaulepu in addition to the water courses which cross the HDF site. One is the Mahaulepu Reservoir which is just mauka of the HDF site and the other is the presumed pump sump for the original 10 wells of the Well 14 Battery. Each is described below.

**Mahaulepu Reservoir.** The reservoir was developed to facilitate furrow irrigation of sugarcane at Mahaulepu. It fell out of consistent use after the conversion from furrow to drip. Today, a low water level is maintained in the Reservoir as a watering hole for beef cattle. The water in the reservoir consists of surface water runoff from the upgradient tributary area supplemented, when necessary, by water from Wa`ia Reservoir. The reservoir has an overflow spillway at its east end which discharges directly into the adjacent branch of the unnamed stream.

**Perennial Sump at the Well 14 Battery.** It appears likely that this perennial water feature is the remnant of the pump sump developed for the battery’s first 10 wells and abandoned when the last four wells were drilled and put into operation in 1928. At present, the water depth in the sump is about three (3) feet and the mud bottom is soft. Before the HDF monitor wells were developed, it was assumed that the water level in the sump was a reflection of the groundwater level in the alluvium. Information subsequently developed has shown that this is not the case:

- The water level in the sump is about 70 to 72 feet (MSL). The water level of groundwater in the alluvium in the nearby HDF-1 monitor well is eight to 10 feet higher.
- In December 2014, the sump was pumped for 95 minutes at about 800 GPM (until the pump broke suction). The water level in the sump drew down and did not recover as it would have if it
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were groundwater in the alluvium (Figure 23). In fact, the level in the sump had not recovered as of July 2015, six months after pumping.

• During the pump test of the Well 14 Battery, there was no drawdown in the sump and no response to disposal of the pumped water such as was recorded at HDF-1 (compare Figure 24 of the sump's response to the HDF-1 response on Figure 16).

Based on this information, the perennial sump is hydrologically disconnected from the groundwater in the alluvium and also from the groundwater at depth in the unweathered volcanics. The isolation of the sump from groundwater in the alluvium surrounding it could be due to the remnants of the sump's walls and/or infilling of silt and clay.

ESTIMATES OF POTENTIAL IMPACTS TO GROUNDWATER AND SURFACE WATER

Identification of the Major Potential Impacts to Consider

There are two major impacts to consider for the operation HDF: (1) its use of surface and groundwater; and (2) its potential increase of nutrients (specifically nitrogen and phosphorus) leaving the HDF site and ultimately discharging into the marine environment. Each of these is discussed and quantified in the sections following.

Expected Use of Groundwater and Surface Water by HDF

Use of Groundwater. HDF will require potable quality water to wash down the milking parlor area (about 30,000 GPD) and for consumption by the cows (at 25 GPD per cow, about 17,500 GPD for the initial 699 cows and up to about 50,000 GPD for expansion up to 2000 cows). This supply will be provided by a pump installed in one of the three remaining wells of the Well 14 Battery. Another pump may be installed in a second well to provide redundant capacity. The total draft of about 47,500 GPD for the initial 699 cows and up to 80,000 GPD for expansion to 2000 cows is a small fraction of the three (3) million gallons per day (MGD) that the Well 14 Battery produced when it was formerly used for sugarcane irrigation. The modest use rate by HDF and the 4500-foot distance to the nearest other operating well (DOW’s Koloa Well F) mean that no adverse impact to ongoing use of groundwater in the volcanics will occur as a result of this use.

Use of Water from Waita Reservoir to Irrigate the Grass. About 347 acres of HDF’s 470 acres of pasture will be irrigated. Two center pivot systems will irrigate 285 acres and 62 acres will be gun irrigated. On Table 6, the estimated monthly and year-round average irrigation rates are compiled (refer to the notes at the bottom of the table for the basis of the calculations). The average irrigation rates are estimated to vary from 0.84 MGD in the wettest month (December) to 1.71 MGD in the driest (June), with a
Figure 23. December 2014 Pump Test of the Perennial Sump at the Well 14 Battery

- Water Level in the Pond (Feet)
- Pumping Rate (GPM)

- Start Pumping
- Vortex at Pump Intake
- Stop Pumping

Time of Day on December 16, 2014
Figure 24. Water Level In the Nearby Sump During and Following the Well 14 Battery Pump Test
<table>
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<th>Days in the Month</th>
<th>Potential Evapotranspiration (Inches)</th>
<th>Actual Evapotranspiration (Inches)</th>
<th>Average Rainfall (Inches)</th>
<th>Effective Rainfall (Inches)</th>
<th>Applied Irrigation Monthly (Inches)</th>
<th>Equivalent (MGD)</th>
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Notes:
2. Actual evapotranspiration is 0.85 times potential evapotranspiration, 0.85 being the crop factor for Kikuyu grass.
3. Average rainfall is from the 30-year daily record of Mahaulepu Station 941.1 from January 1984 through December 2013.
4. Effective rainfall is approximated as the daily rainfall amounts up to 0.80 inches at Station 941.1. Daily amounts greater than 0.80 inches are assumed to become runoff.
5. Applied irrigation is actual evapotranspiration less effective rainfall applied to 347 acres of irrigated pasture.
year-round average of 1.31 MGD. This additional use of the Waita Reservoir system is well within its capacity.

Potential Increases of Nitrogen and Phosphorus Leaving the HDF Site

**Methodology.** The approach to estimate potential increases of nitrogen and phosphorus in surface and groundwater resulting from the development of HDF is to calculate the flow volumes and nutrient loading under “present” (pre-HDF) conditions and to compare those amounts to forecast conditions with the initial farm size of 699 cows and the possible subsequent expansion of up to 2000 cows. The estimates herein rely heavily on information in the “Nutrient Balance Analysis for Hawaii Dairy Farms” (by Group 70 and Red Barn Consulting dated March 2016) and “Hawaii Dairy Farms Drainage Memorandum” (by Group 70 and dated August 2015).

With regard to groundwater, the estimates of potential impacts focus exclusively on the groundwater in the alluvium on which the HDF site sits. As described earlier in this report, the groundwater in the underlying volcanics is hydrologically separate from groundwater in the alluvium and will not be impacted by HDF activities. The surface water estimates include the runoff from the areas outside of the HDF site which flow through the HDF site via the system of natural and manmade waterways which ultimately discharge in one or the other of the two ditches leaving the makai end of the HDF site.

**Existing Groundwater Flow and Nitrogen and Phosphorus Loading.** Two order of magnitude estimates of the groundwater flow in the alluvium beneath the HDF site have been made to provide an approximation of the flowrate. The area of the alluvium in Mahaulepu Valley is approximately 720 acres. HDF comprises 557 acres of this area and will irrigate 347 acres of its 557-acre site. Rainfall across the alluvium varies from 45 inches per year at the makai end (site of Mahaulepu Station 941.1) to about 55 inches at its mauka end. One order of magnitude estimate assumes 10 percent of the rainfall on the 373 acres of unirrigated area and 10 percent of the applied irrigation on the remaining 347 acres becomes recharge to groundwater in the alluvium. These assumptions amount to a year-round average flowrate of groundwater in the alluvium of about 0.27 MGD.

The other order of magnitude approximation uses the apparent groundwater gradient between the upstream HDF-1 and HDF-2 monitor wells and the downgradient HDF-3 monitor well (a water level drop of 30 feet over a 4800-foot distance), an approximation of the flow’s cross sectional area (4500-foot width and 250-foot depth), and an estimate of the formation’s average permeability coefficient (almost certainly less than five feet per day; it is highly variable in both horizontal and vertical directions). For these values, the approximated average flowrate is 0.265 MGD, essentially the same as the approximation based on recharge by rainfall and return irrigation. For the computations to follow, it is assumed that the flowrate is 0.27 MGD.
The nitrogen and phosphorus content in this groundwater leaving the makai end of the HDF site is taken as the average concentrations of the four samples taken from the HDF-3 monitor well (refer to Table 2). For the 0.27 MGD average daily flowrate, these concentrations are equivalent to 0.91 and 0.074 pounds of nitrogen and phosphorus per day, respectively, in groundwater in the alluvium leaving the makai end of the HDF site.

**Existing Surface Water Flow and Nitrogen and Phosphorus Loading.** Approximately 1770 acres of area drain into the two major mauka-to-makai drainageways which leave the makai end of the HDF site. About 720 acres (including all of the 557-acre HDF site) is relatively flat land and the remaining 1050 acres is the steeply sloping surrounding ridges. Average annual rainfall across the flat land is 45 to 55 inches. Average annual rainfall on the steeper ridges is about 60 inches. As a first order approximation, it is assumed that the surface water runoff consists of 15 percent of the rainfall on the flat land and 30 percent of the rainfall on the steeper surrounding ridges. These assumptions translate to average annual runoff rates of 0.40 MGD from the flat land and 1.41 MGD from the steeper ridges. Notably, this estimate of the surface runoff is about seven times greater than the estimated groundwater flowrate in the alluvium.

Nitrogen and phosphorus concentrations in runoff from the flat land are assumed to be the same as the samples from Sample Site 10 at the makai end of the HDF site (Table 5). Concentrations in runoff from the steep surrounding lands are assumed to be the same as Sample Sites 1 and 2 which are inland of the HDF site. For this set of assumptions, the average daily amounts of nitrogen and phosphorus in surface runoff leaving the HDF site are 3.20 and 0.22 pounds, respectively. These amounts are about three times greater than the estimated amount carried in groundwater moving through the alluvium.

Based on the calculations and assumptions described above, the estimated total annual load of nitrogen and phosphorus from groundwater in the alluvium leaving the makai end of the HDF Site under existing conditions is 332 and 27 pounds per year, respectively. The totals for nitrogen and phosphorus in surface water leaving the site are 1170 and 80 pounds per year, respectively.

**Potential Nutrient Additions by Hawaii Dairy Farms.** From the perspective of potential nutrient additions to surface and groundwater, the operation of HDF can be characterized as a semi-enclosed loop system: nutrients are taken up by the Kikuyu grass; the cows eat the grass as their primary food supply (they will also eat commercial feed while in the milking parlor); nutrients in the grass and commercial feed consumed by the cows are returned to the ground, either as manure excreted on the pastures or as manure collected in the milking parlor and applied to the pastures; and the shortfall of nutrients in the manure to grow the grass is made up by the application of commercial fertilizer.

**Quantification of Circulating Nutrient Amounts in the Dairy Operation.** Table 7 is a quantification of monthly amounts of nitrogen and phosphorus produced and consumed at HDF, initially with 699 cows and ultimately if the HDF expands up to 2000 cows. The compilations are based on the following:
## Nutrient Balance Calculations for Herd Sizes of 699 and 2000 Cows

### Table 7

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<thead>
<tr>
<th></th>
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<td>66,308</td>
<td>67,046</td>
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<td>104,689</td>
<td>6.95</td>
<td>7.54</td>
<td>7.56</td>
<td>5.88</td>
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<tr>
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<tr>
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<td>9.02</td>
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### Table 7

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<td>7.79</td>
<td>15,050,925</td>
<td>15,050,925</td>
</tr>
</tbody>
</table>
• Grass will be grown on 470 acres of the HDF site during the initial herd size of 699 cows and if HDF expands up to 2000 cows;
• Nutrient uptake (specifically nitrogen and phosphorus) by the Kikuyu grass is based on trials at the HDF site conducted to date;
• Manure production rates by the cows are based on available data from cows elsewhere. In the future, the nutrient balance calculations will be updated based on actual manure production at HDF;
• The cows will be awake for 16 hours a day. In two daily 1-hour sessions, the cows will be in the milking parlor or the adjacent holding yard. All manure produced in the milking parlor and holding yard will be collected and redistributed to the pastures, either as diluted liquid effluent in the irrigation water or as slurries applied by pumps to selected pastures;
• In the 14 hours of the day when cows are awake and in the pastures, all manure produced by the cows will be deposited in the pastures.

Based on the forgoing and as detailed on Table 7, the nutrient amounts in the manure produced by the cows will not be sufficient to grow the grass. The shortfall of the manure-supplied nutrients, detailed in the last two columns of Table 7, define the amounts of nitrogen and phosphorus that will need to be provided by applications of commercial fertilizer. These amounts are summarized on an annual basis on Table 8. It should be noted that, with the present data and assumptions listed in the bullet points above, the calculations show that the phosphorus in the manure produced by 2000 cows exceeds the uptake by the Kikuyu grass (last column on the right at the bottom of Table 7). HDF believes that the current tested grass yield of 16.3 tons of dry matter per acre will increase to about 20 tons of dry matter per acre. With such an increase, an excess of phosphorus in the manure of 2000 cows would not actually occur. If the increase in grass yield does not occur, the ultimate herd size would be less than 2000 cows and the number of cows would be limited by the actual grass yield. Increasing the herd size beyond the initial 699 cows would be gradual and monitoring of nutrients in the manure, actual uptake of nutrients by grass, and the nutrient content in soil would be ongoing.

Potential Losses of Nitrogen and Phosphorus to Surface and Groundwater. In rounded numbers and on an annual basis for both herd sizes, HDF will be circulating 490,000 pounds of nitrogen and 87,000 pounds of phosphorus. These amounts are about 325 and 815 times greater than the estimates of nitrogen and phosphorus currently carried in surface and groundwater moving through the HDF site and ultimately discharging into the marine environment. At issue is how much of the nitrogen and phosphorus deposited on the farm as manure and in applied commercial fertilizer will leave the site and increase the present nutrient load that ultimately discharges into the marine environment. There are several aspects to consider in arriving at an estimate:

• Relative to the amount of surface water moving through the HDF site, the groundwater flow in the alluvium is relatively modest. The formation is poorly permeable and even after HDF is in
### Table 8
Annual Nitrogen and Phosphorus Supplements Required to Grow Kikuyu Grass on 470 Acres of Pasture

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<tr>
<th>Item</th>
<th>699 Cows</th>
<th>2000 Cows</th>
</tr>
</thead>
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<tr>
<td><strong>Uptake by Kikuyu Grass on 470 Acres of Pasture</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Nitrogen (lbs / year)</td>
<td>490,200</td>
<td>490,200</td>
</tr>
<tr>
<td>• Phosphorus (lbs / year)</td>
<td>87,317</td>
<td>87,317</td>
</tr>
<tr>
<td><strong>Manure Production in Milking Parlor and Pastures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Nitrogen (lbs / year)</td>
<td>149,524</td>
<td>432,664</td>
</tr>
<tr>
<td>• Phosphorus (lbs / year)</td>
<td>31,277</td>
<td>91,012</td>
</tr>
<tr>
<td><strong>Required Supplements in Commercial Fertilizer to Grow the Grass</strong></td>
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<td></td>
</tr>
<tr>
<td>• Nitrogen (lbs / year)</td>
<td>340,676</td>
<td>57,536</td>
</tr>
<tr>
<td>• Phosphorus (lbs / year)</td>
<td>56,040</td>
<td>(-) 3,695</td>
</tr>
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</table>
full operation, the contribution in the groundwater flow to an increase in nutrient load will be significantly less than in surface water.

- The Hawaii Dairy Farms Drainage Memorandum (Group 70, August 2015) identifies a number of design and best management practices intended to limit the amount of runoff and to filter the sediment in that runoff. Most significant among these are set backs, filter strips, and buffer plantings on both sides of drainageways. The herbaceous cover area will be 35 feet wide on both sides of the drainageways.
- Perhaps the biggest factor will be the operating skill of the HDF personnel, including tracking the nutrient balance to avoid excessive use of fertilizer and in anticipating weather patterns to avoid irrigating in advance of heavy, runoff-producing rainfall.

Based on the 30-year daily rainfall record of the Mahaulepu 941.1 gage (January 1984 through December 2013), which was located at the makai end of the HDF site, rainfall on the proposed pasture lands is actually quite modest. Fifty eight (58) percent of the days had no rainfall and 97 percent of the days had less than 0.8 inches (Figure 25). Using the NRCS curve number method to compute runoff for the site’s B and D class soils and irrigated pasture in good condition, it is anticipated that actual runoff into drainageways from HDF’s pastures will only occur on days when the rainfall exceeds 0.8 inches. Using the 30-year record of the Mahaulepu 941.1 gage, such rainfall will occur on about three percent of days or about ten days a year on average. These runoff-producing rainfall events will be the primary mode of conveyance of nitrogen and phosphorus into drainageways and ultimately into the marine environment. The amounts are estimated as follows:

- As a first order approximation, it is assumed that two (2) percent of the nitrogen and one (1) percent of the phosphorus of HDF’s annual manure and commercial fertilizer amounts are carried into the drainageways and/or percolate to the shallow groundwater in the alluvium. In round numbers, this would amount to about 10,000 pounds per year of nitrogen and 900 pounds per year of phosphorus. Notably, these amounts would be the same for both the 699- and 2000-cow herd sizes.
- Compared to the present contribution from and through the HDF site, these additions would represent 6.6- and 8.4- fold increases of nitrogen and phosphorus moving to ultimate discharge into the marine environment, respectively
- These increases would primarily occur during and immediately following runoff producing rainfall events rather than occur continuously throughout the year.

Relative to the nutrient loading under existing conditions, the potential increases due to the operation of HDF are obviously substantial. To provide some perspective, a comparison to ongoing nutrient additions to the marine environment by other projects and/or users along the Poipu coastline is instructive. These additions include the production of domestic wastewater and the application of fertilizers
Figure 25. Frequency of Occurrence of Daily Rainfall Amounts at Mahaulepu Station 941.1 (January 1984 thru December 2013 Data)

- 97 Percent of Days with Essentially No Runoff from the HDF Site
- 58 Percent of Days with No Rainfall
on the area’s two golf courses and other landscaping. Their potential contributions of nitrogen and phosphorus to the marine environment are conservatively estimated as follows:

- The total production and disposal of domestic wastewater in the Koloa-Poipu area is on the order of 1.5 MGD. About 1.36 MGD is in DOH-UIC authorized disposal wells (Table 9) and the balance is an approximation of the contribution from household cesspools and septic tank-leach field systems.
- Nitrogen and phosphorus concentrations in the domestic wastewater are 40 and 10 MG/L, respectively.
- Ultimately, 15 percent of the nitrogen and two (2) percent of the phosphorus enter the marine environment.
- Fertilizer is applied on 400 acres in the Koloa-Poipu area (two golf courses, numerous parks, and other landscaped areas).
- Fertilizer applications of nitrogen and phosphorus average eight (8) and one (1) pound per 1000 square feet per year, respectively.
- Eight (8) and two (2) percent of the applied nitrogen and phosphorus escape to the groundwater below and are ultimately discharged into the marine environment.

For this set of assumptions, the ongoing input to the marine environment along the Poipu shoreline is as tallied below. For nitrogen, the ongoing amount is about 3.8 times the estimated potential contribution from HDF. For phosphorus, the ongoing discharge is about 1.4 times as great as the potential discharge from HDF. These discharges are essentially constant throughout the year in comparison to the expected episodic discharges from HDF.

<table>
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<tr>
<th>Contributing Source</th>
<th>Nitrogen (lbs/yr)</th>
<th>Phosphorus (lbs/yr)</th>
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<td>Domestic Wastewater</td>
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<tr>
<td>Fertilizing Landscaping</td>
<td>11,150</td>
<td>350</td>
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<tr>
<td>Total</td>
<td>38,510</td>
<td>1260</td>
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Attachment 5: List of Injections Wells Poipu-Koloa and Mahaulepu Watersheds

Table: Poipu-Koloa Injection Wells, Volume, UIC #, Location

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<tr>
<th>PERMIT #</th>
<th># OF WELLS</th>
<th>FACILITY TYPE</th>
<th>FLOW gpd</th>
<th>FACILITY NAME</th>
<th>TMK #</th>
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<tr>
<td>UK-1218</td>
<td>1</td>
<td>WWD</td>
<td>7,000</td>
<td>Koloa Garden Apts SEW</td>
<td>4:2-6-04:033</td>
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<tr>
<td>UK-1236</td>
<td>1</td>
<td>WWD</td>
<td>6,000</td>
<td>Poipu Palms Condo SEW</td>
<td>4:2-8-20:041</td>
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<tr>
<td>UK-1256</td>
<td>3</td>
<td>WWD</td>
<td>27,200</td>
<td>Nihi Kai Villas SEW</td>
<td>4:2-8-19:012</td>
</tr>
<tr>
<td>UK-1277</td>
<td>2</td>
<td>WWD</td>
<td>20,000</td>
<td>Whaler’s Cove Condo</td>
<td>4:2-6-07:013</td>
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<td>UK-1292</td>
<td>4</td>
<td>WWD</td>
<td>240,000</td>
<td>Poipu Kai STP</td>
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<td>UK-1338</td>
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<td>10,000</td>
<td>Poipu Shores Condo STP</td>
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<td>UK-1387</td>
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<td>WWD</td>
<td>0</td>
<td>Old Koloa Town STP</td>
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<td>UK-1476</td>
<td>4</td>
<td>Drainage Well</td>
<td>*</td>
<td>Hyatt Regency Kauai</td>
<td>4:2-9-01:002</td>
</tr>
<tr>
<td>UK-1515</td>
<td>1</td>
<td>WWD</td>
<td>50,000***</td>
<td>Hyatt Regency Kauai WWTP</td>
<td>4:2-9-01:002</td>
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<td>UK-1556</td>
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<td>*</td>
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<td>UK-2388</td>
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<td>WWD</td>
<td>800,000</td>
<td>Poipu WRF</td>
<td>4:2-8-14:027</td>
</tr>
</tbody>
</table>

Source: SDWDB UIC Program, July 2015
WWD = Waste Water Disposal
1 Abandoned but not closed
* Variable and Intermittent discharge
** Damage due to hurricane and may not be operating but permit is still open
*** Standby well to accommodate effluent not used for irrigation or water feature at Poipu Kai Golf Course

Source: DOH Clean Water Branch

Table 9
UIC Permitted Disposal Wells in the Koloa-Poipu Area
APPENDIX F

BASELINE CONDITIONS AND AN ASSESSMENT OF THE EFFECT OF THE PROPOSED HAWAII DAIRY FARM ON SURFACE WATER AND MARINE WATER CHEMISTRY MAHAULEPU, KAUA'I, HAWAII

MARINE RESEARCH CONSULTANTS, INC.
BASELINE CONDITIONS AND AN ASSESSMENT OF THE EFFECT OF THE PROPOSED HAWAII DAIRY FARM ON SURFACE WATER AND MARINE WATER CHEMISTRY
MAHAULEPU, KAUAI, HAWAII

Prepared for:
Group 70 International, Inc.
925 Bethel St., 5th Fl.
Honolulu, HI 96813

By:
Marine Research Consultants, Inc.
1039 Waakaua Pl.
Honolulu, HI 96822

May 16, 2016
I. INTRODUCTION AND PURPOSE

In late 2013, Ulupono Initiative made the investment to fund Hawai‘i Dairy Farms, the first pasture-based rotational-grazing dairy in the state. Hawai‘i Dairy Farms, LLC (HDF) was formed as a positive step toward the island state’s food security, economic diversity, and sustainability. Experimental trials were conducted to determine lands capable of growing nutritious forage for dairy cows, and lands meeting the operational requirements for a dairy operation were identified. Kaua‘i was determined to best meet operational requirements, and Māhā‘ulepū Valley was found to provide ideal growing conditions.

At steady-state production with 699 milking cows, the farm will produce roughly 1.2 million gallons annually at market price. HDF will reduce Hawai‘i’s reliance on imported milk from the mainland United States by increasing current fresh local milk production by approximately 33 percent. The farm will be based on the most successful island dairy models in the world, and will utilize a sustainable, pasture-based rotational-grazing system and 21st century technology. The farm will be very different from conventional feedlot dairy operations.

HDF is committed to establishing a herd of up to 699 mature dairy cows, and demonstrating the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. The application process for a National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) permit includes public notification and input. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is currently estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

Dairy-related facilities will occupy approximately 10 acres along the western boundary of the project area. Buildings will include a milking barn with a rotary milking platform and milk storage tanks, two calf sheds, and an implementation shed for tools and equipment. Manure captured during the milking process will be transferred through underground pipes to two nearby effluent ponds, where solids will be settled out and the remaining fluid applied to the pasture through the irrigation system. When applied via the irrigation system, non-potable water from the Waita Reservoir will be added to nutrient rich liquid for irrigation use. The effluent ponds will be sealed with a flexible membrane liner, and will be constructed within a secondary
containment berm. Paved access roads and a truck turnaround area for milk tanker trucks, grain silos, and a holding yard for cows waiting to enter the milking parlor will also be part of the project.

Agricultural infrastructure from prior sugar cane cultivation within the project area, such as gravel access roads, field roads, reservoirs, pipelines, irrigation ditches, drainage ways and culverts will be adapted for reuse where possible. Additional field improvements will include a livestock water distribution system, pivot irrigation system, culverts and fencing.

Surface waters draining the project site meet Waiopili Ditch, and will eventually reach the ocean. While all construction and operational activities of HDF will utilize best management practices to protect groundwater and surface water resources and the marine environment downslope from the dairy site, it is nevertheless important to identify any potential impacts that may be associated with the planned dairy. Proposed land uses do not include any direct alteration of coastal areas or nearshore waters. However, the dairy operation will result in some changes to the composition and volume of surface water and groundwater that flows beneath the property. Therefore, evaluating the potential for alterations to water quality and marine life from material input from the dairy constitutes an important factor in the planning process.

In the interest of addressing these concerns and assuring maintenance of environmental quality, a program to assess groundwater, surface water, and nearshore marine water quality and potential impact analysis of the nearshore areas off the HDF was conducted in 2014-1015. Baseline data on groundwater, surface water, and nearshore marine water quality was recorded. The rationale of the water quality assessment was to determine the contribution of groundwater to the marine environments down gradient of the HDF site, and to evaluate the effects this input has on water quality at the present time, prior to the commencement of any dairy activities. Combining this information with estimates of changes in groundwater and surface water flow rates and chemical composition that could result from the proposed project provides a basis to evaluate the potential future effects to the marine environment.

Predicted changes in surface water and groundwater composition and flow rates have been supplied by Tom Nance Water Resource Engineering (TNWRE 2016).

Results of the combined evaluation provided an estimate of the degree of change to the marine environment that could occur as a result of Hawaii Dairy Farms project.
II. METHODS

A. Water Quality/Chemistry

Twelve survey sites were established in the surface waters that traverse the HDF property (see Figure 1). Stations 1 and 2 were located outside the mauka boundary of the site, Stations 3-6 were located within the HDF site, while Stations 7-10 were positioned at the makai end of the HDF site. Stations 11 and 12 were located off the HDF property between the boundary and the ocean. Site 12 was located near the juncture of the ditch and the ocean. Samples were collected by monitoring personnel filling pre-rinsed linear polyethylene bottles with undisturbed surface water. Sampling was conducted on six separate occasions (October 14, 2014, October 29, 2014, November 11, 2014, March 4, 2015, May 8, 2015 and July 9, 2015).

In addition, on October 6, 2014 four transects extending from the shoreline to approximately 200 meters (m) offshore were established for marine sampling (Figure 1). Water quality was evaluated on transects that were oriented perpendicular to the shoreline and depth contours. Water samples were collected at five locations on each transect from just seaward of the shoreline to approximately 200 meters (m) offshore (1, 5, 10, 25, 100 and 200 m). Such a sampling scheme was designed to span the greatest range of salinity with respect to potential freshwater efflux at the shoreline. Sampling was more concentrated in the nearshore zone because this area receives the majority of groundwater and surface water discharge, and hence is most important with respect to identifying the current status and potential future impacts.

All water samples were collected by swimmers working from a jet-ski. Owing to the shallow depth of the nearshore shelf, at stations with water depth less than 1 m a single sample was collected within 20 cm of the sea surface by swimmers working from shore. At stations with water depths greater than 1 meter, samples were collected at two depths; a surface sample was collected within approximately 20 cm of the sea surface, and a bottom sample was collected within 1 m of the sea floor.

In order to determine the existing chemical constituents of groundwater, samples were collected from several wells on and around the project site in 2015 (see report by Tom Nance Water Resources Engineering for locations of wells and results of well water analyses).

Water quality parameters evaluated included the ten specific criteria designated for open coastal waters in Chapter 11-54, Section 06 (b) of the State of Hawaii Department of Health (DOH) Water Quality Standards. These criteria include: total nitrogen (TN), nitrate + nitrite nitrogen (NO\textsubscript{3}^- + NO\textsubscript{2}^-), ammonium nitrogen (NH\textsubscript{4}^+), total phosphorus (TP), orthophosphate phosphorus (PO\textsubscript{4}^{3-}), Chlorophyll a (Chl a), turbidity, temperature, pH and salinity. In addition, silica
(Si) was also reported because these parameters are sensitive indicators of biological activity and help determine the degree of groundwater input in the coastal ocean.

Sampling protocols followed the relevant State of Hawaii Department of Health Clean Water Branch Quality Assurance Project Plan. Surface water samples were collected by filling pre-rinsed, 1-liter polyethylene bottles. Deep water samples were collected using a Niskin-type oceanographic sampling bottle. The bottle is lowered to the desired sampling depth with spring-loaded endcaps held open so water can pass freely through the bottle. At the desired sampling depth, a weighted messenger released from the surface triggers closure of the endcaps, isolating a volume of water.

Subsamples for nutrient analyses were immediately placed in 125-milliliter (ml) acid-washed, triple rinsed, polyethylene bottles and stored on ice. Analyses for Si, NH₄⁺, PO₄³⁻, and NO₃⁻ were performed on filtered subsamples with a Technicon Autoanalyzer using standard methods for seawater analysis (Strickland and Parsons 1968, Grasshoff 1983). TN and TP were analyzed in a similar fashion following digestion. Total organic nitrogen (TON) and total organic phosphorus (TOP) were calculated as the difference between TDN and dissolved inorganic N, and TDP and dissolved inorganic P, respectively.

Water for other analyses was subsampled from 1-liter polyethylene bottles and kept chilled until analysis. Chl a was measured by filtering 300 ml of water through glass-fiber filters; pigments on filters were extracted in 90% acetone in the dark at -20°C for 12-24 hours. Fluorescence before and after acidification of the extract was measured with a Turner Designs fluorometer. Salinity was determined using an AGE Model 2100 laboratory salinometer with a readability of 0.0001‰ (ppt). Turbidity was determined using a 90-degree nephelometer, and reported in nephelometric turbidity units (NTU) (precision of 0.01 NTU). Vertical profiles of salinity, temperature and depth were acquired using a RBR-620 CTD calibrated to factory standards.

Surface water samples were also analyzed for the indicator bacteria Enterococcus and Clostridium perfringens. Separate water samples were collected in autoclaved polyethylene bottles and returned to the analytical lab within 6 hours of collection. Enterococcus were analyzed according to EPA Method 1600 (Enterococci in Water by Membrane Filtration Using membrane-Enterococcus Indoxyl-β-D-Glucoside Agar [mEI]), while Clostridium were analyzed using membrane filter enumeration following the protocols in Bisson and Cabelli (1979). All indicator bacterial analyses were conducted by Analytical Services, LLC in Honolulu, HI.

All fieldwork for all surveys was conducted by Dr. Steven Dollar. All water chemistry laboratory analyses were conducted by Marine Analytical Specialists located in Honolulu, HI (Labcode: HI 00009). This analytical laboratory possesses acceptable ratings from EPA-compliant proficiency and quality control testing.
III. RESULTS

A. Surface Water Chemistry

1. Distribution of Chemical Constituents

While the main surface water course which crosses the HDF site is called “Waiopili Ditch” this feature is not named on the USGS quadrangle map. At its mauka end above the HDF property, it is a relatively steep, naturally occurring water course with several small tributaries. Across the HDF property and for some distance further makai, the channel is manmade to facilitate former sugarcane cultivation. Along part of the course across the HDF property, the channel functions as a drain for groundwater discharged from the alluvium on a seasonal basis. Most of the channel is overgrown by dense vegetation, making access to flowing water difficult. At no point can the ditch be considered a recreational resource, including the channel near its terminus at the ocean.

Tables 1 and 2 show results of water chemistry analyses for samples collected in surface waters and the adjacent ocean during six increments of sampling in 2014 and 2015. Table 1 shows concentrations of dissolved nutrients in micromolar (μM) units; Table 2 shows concentrations in micrograms per liter (μg/L). Concentrations of twelve water chemistry constituents from the six sampling events are shown in Figures 2-5.

Several patterns of distribution are evident in Tables 1-2 and Figures 2-5. With the exception of Si, concentrations of all dissolved nutrients (NO₃⁻, PO₄³⁻, NH₄⁺, TN, TP) are relatively low at mauka sampling stations 1-3 located near the upper boundary of the property (Figures 2 and 3). Concentrations of these constituents increase to higher values at Stations 4-10, located within the boundaries of the HDF site. Values then decrease to relatively constant values at Stations 11-12 makai of the HDF site. Concentrations of all nutrients in the nearshore ocean samples are of similarly low values as concentrations from stations located at the mauka boundary of the HDF property.

As noted above, dissolved Si is the only nutrient that deviates from this pattern. Concentrations of Si are highest at the mauka end of the sampling scheme and lowest at the ocean (Figure 2). As Si is generally higher in groundwater relative to surface water, the observed pattern suggests that the surface water at upper elevations contains a higher proportion of groundwater. The contribution of low Si surface water makes up a progressively larger component of surface water downgradient of the HDF property. As natural marine waters contain substantially less Si than either surface water or groundwater, mixing of these waters at the shoreline results in the observed lowest concentrations of Si.

The pattern of Si distribution provides an indication of the processes driving the observed patterns of other dissolved nutrients described above (low levels at mauka
boundary, higher levels on HDF site, low levels below makai boundary). Composition of surface water at the mauka regions appears to consist primarily of groundwater, as it is relatively low in dissolved plant nutrients (N and P). As water flows through the HDF site, it appears that nutrient concentrations are augmented by input from drainage of surface water that contains some leachate from surrounding lands. Such leachate may contain some subsidies from either prior or ongoing land usages. However, between the time that surface water leaves the HDF site and reaches the ocean, nutrient concentrations return to levels similar to those above the site. As these subsidies are not evident in surface water samples collected below the HDF site, it is likely that the nutrient subsidies are small and rapidly diluted with flow through the ditch to the ocean. By the time surface water reaches the ocean, nutrient concentrations are similar to those above the HDF site, suggesting that the values at the surface water-ocean boundary are the same as what they would be without the nutrient subsidy from leachate observed on the HDF site.

Plots of salinity at each of the surface water sampling stations shows essentially no change until surface water mixes with ocean water (Figure 4). Plots of turbidity and Chl a show similar patterns as the dissolved nutrients. Values are lowest at the mauka end of the sampling regime about the HDF site, show elevated levels at several of the sampling stations within the dairy, and return to baseline low levels below the dairy site and in the nearshore ocean.

2. Indicator Bacteria

Tables 1 and 2 also show counts of Enterococci and Clostridium indicator bacteria measured in surface water during four of the sampling events. For both indicators, there is a general pattern of increasing counts moving closer to the shoreline. During all but one sampling date, the highest single count of enterococcus occurred at either Station 11 or 12 (during the May 8, 2015 survey, the peak value was at Station 5A). Of the two sampling sets that included Clostridium, the May 8, 2015 set showed a clear progression of increasing values, while the July 9, 2015 set revealed no consistent pattern. While the bacteria are generally intended to serve as indicators of human fecal contamination, it is clear from the elevated counts in surface waters that there are other sources contributing to the colony counts. These sources may include feral animals (e.g., pigs) or domesticated animals (sheep) that are being raised near the HDF site. As no dairy cattle were present on the site during any of the sampling events, it is clear that the observed counts of indicator bacteria are not a result of dairy operations.

However, an overall consistent pattern for both indicator bacteria is that counts in nearshore ocean water were consistently lower than in surface waters. During the March 4, 2015, enterococcus counts were 780 at Station 12, and below detection for both samples collected near the juncture of the ditch and ocean. While not reaching levels of non-detection during the other two events where ocean samples were analyzed, counts were substantially lower in the ocean than in the ditches. As these samples are collected within several tens of meters of each other, it is apparent
that both physical mixing processes and the lethal effects of high saline water on bacteria result in substantial reduction in the nearshore ocean.

B. Marine Water Chemistry

1. Distribution of Chemical Constituents

Tables 3 and 4 show results of ocean water chemistry analyses for samples collected on October 6, 2014. Table 1 shows concentrations of dissolved nutrients in micromolar (μM) units; Table 2 shows concentrations in micrograms per liter (μg/L).

Concentrations of eight dissolved nutrient constituents in surface and deep samples are plotted as functions of distance from the shoreline in Figure 6. Values of salinity, turbidity, Chl \( a \) and pH as functions of distance from shore are shown in Figure 7.

Several patterns of distribution are evident in Tables 3-4 and Figures 6-7. It can be seen that on Transects 1, 2 and 4 that dissolved nutrients do not display any distinctly elevated concentrations throughout the length of the sampling transects. Low concentrations at the shoreline with progressively lower values with distance from shore indicates that there is little groundwater or surface water emanating at the shoreline near Transects 1, 2 and 4. Examination of the trends of salinity in Tables 3 and 4 and Figure 7 indicate that only at Transect 4 is there an indication of slightly lower salinity at the shoreline (31.6‰). While there is a corresponding increase in Si, there is no such corresponding increase in NO\(_3\)-, suggesting that the lower salinity is a result of dilution from surface water rather than inputs from groundwater.

Examination of the patterns of nutrient concentrations and salinity as functions of distance from the shoreline at Transect 3 provides an entirely different picture than for the other transects. Samples collected within 5 m of the shoreline exhibit substantially higher values of all dissolved nutrients. These elevated values are the result of input of surface water from Waiopili Ditch. While the values close to the shoreline are elevated, beyond 10 m of the shoreline they return to values similar to the other transects. Hence, while there is a distinct signature from input of surface water, such input is rapidly mixed to background levels within 10 meters of the shoreline.

Salinity, turbidity and Chl \( a \) on Transect 3 exhibit the same patterns as dissolved nutrients. Within 10 m of the shoreline all of these constituents display elevated values that rapidly return to background levels.

It is important to note that the southeast coastline of Kauai, where the sample sites are located are subjected to direct effects of tradewinds, as well as south, north and east swells. As a result, vigorous physical mixing processes are the typical condition in the nearshore ocean. As safety considerations dictate, ocean sampling can only be conducted during relatively calm seas, as were the conditions during the October 6,
2014 sampling event. In addition, sampling was conducted at low tide, when mixing between groundwater/surface water and ocean water is minimized. Hence, the results of the present study represent a case with minimal mixing of water masses in the nearshore ocean. Under these conditions, the effects of input of groundwater/surface water will be most apparent. It is likely that during typical tradewind conditions, and with larger surf, the zone of mixing would be far smaller than is evident in the data presented in this report.

2. Conservative Mixing Analysis

A hydrographic mixing model is used to interpret the extent of material input from land. In the simplest form, the model plots the concentration of a dissolved nutrient constituent as functions of salinity. The concept of using such mixing models that scale nutrient concentrations to salinity is utilized by the State of Hawaii Department of Health for establishing a unique set of water quality standards for the West Coast of the Island of Hawaii [Hawaii Administrative Rules, §11-54-06 (d)]. While the HDOH has not yet extended this method of analysis to monitoring in other areas of the State, it is useful to employ the techniques as a way of better understanding the sources of material input to marine waters.

Figure 8 plots the concentrations of Si, NO$_3^-$, PO$_4^{3-}$, and NH$_4^+$ as functions of salinity for the samples collected at each ocean transect site. Each graph also shows two conservative mixing lines constructed by connecting the endmember concentrations of open ocean water and groundwater from two monitoring wells that penetrate the alluvium underlying the HDF site, and the mean values of nutrient concentration from Station 12 in Waiopili Ditch (see Figure 1).

Comparison of the curves produced by the distribution of data with conservative mixing lines provides an indication of the origin and fate of the material in question. If the constituent in question displays purely conservative behavior (i.e., no input or removal from any process other than physical mixing), data points should fall on, or near, the conservative mixing line. If however, external material is added to the system through processes such as leaching of fertilizer nutrients to groundwater, data points will fall above the mixing line. If material is being removed from the system by processes such as biological uptake, data points will fall below the mixing line.

Dissolved Si represents a check on the method as this material is usually present in high concentrations in groundwater, low concentration in open coastal waters, and is not a major component of fertilizer or sewage effluent. In addition, Si is not utilized rapidly within the nearshore environment by biological processes. It can be seen in Figure 8 that all data points for all four transect sites fall in a linear array on the conservative mixing line created with end-point concentrations from the water from Waiopili Ditch; none of the data points line near the groundwater mixing line. However, as the concentrations from the samples collected off Transect 3 are so much higher than off the other transects, it is likely that small amounts of groundwater
discharge would be masked by surface water input. This plot indicates that at the
time of sampling, most of the freshwater entering the ocean emanated from Waiopili
Ditch.

The plots of NO₃⁻ versus salinity show a different distribution than Si. Data points from
Transects 1 and 2 fall near the groundwater mixing line. Such a result is not
unexpected as these transects are the farthest from the point of discharge of Waiopili
Ditch. The two low salinity points from Transect 3 lie between the mixing lines,
suggesting that there is a contribution of both surface water from Waiopili Ditch and
groundwater. While this result appears somewhat contradictory to the interpretation
of the Si data, it may be explained in that the mean concentration of NO₃⁻ at Station
12 was less than the concentration on the day of ocean sampling. Data points from
Transect 4 lie below the Waiopili Ditch mixing line, suggesting that there is input to the
ocean of surface water slightly lower in NO₃⁻ than found in Waiopili Ditch.

While PO₄³⁻ is also generally found in groundwater in higher concentrations than
open coastal water, it occurs in far lower concentrations compared to NO₃⁻, owing in
part to a high absorptive affinity of phosphorus in soils or rock. It can be seen in
Figure 8 that the concentrations of PO₄³⁻ are higher in surface water than in Well
water. When plotted as functions of salinity, concentrations of PO₄³⁻ do not prescribe
linear patterns similar to Si and NO₃⁻. Values of PO₄³⁻ in samples collected near the
shoreline of Transect 3 lie far below both mixing lines. As all values of PO₄³⁻ are below
0.2 µM, there is essentially no influence from inputs from land.

Plots of concentrations of NH₄⁺ versus salinity show similar relationship as PO₄⁻³. Plots of
concentrations of NH₄⁺ versus salinity indicate that the range of values is small, even
with the substantial input of surface water at the shoreline.

3. Compliance with DOH Criteria

DOH Water Quality Standards include specific criteria for three situations; criteria that
are not to be exceeded during either 10% or 2% of the time, and criteria that are not
to be exceeded by the geometric mean of samples. Comparing sample
concentrations to these criteria provide an indication of whether water quality is near
the stated specific criteria.

Noted in Tables 1 and 2 are samples that exceed DOH 10% water quality standards
for open coastal waters under "dry" conditions. The criteria for dry conditions are
applied to the Mahaulepu area under the probable assumption that this region
receives less than 3 million gallons of groundwater input per mile per day.

Comparison of water chemistry results with DOH criteria reveals that during the
October 2014 sampling, the only constituent on transects 1-3 that exhibited consistent
exceedance of the “not to exceed more than 10% of the time” criteria was turbidity
and Chl a. Samples collected with 10 m of the shoreline on transects 2 and 3 had
turbidity values that exceeded DOH standards. As these samples were collected in the surf zone at the shoreline, such elevated turbidity is expected as a result of resuspension of naturally occurring marine sands. Similarly, Chl a at stations near the shoreline was elevated, likely as a result of resuspension of plant material.

At transect 4, however, all nutrient values in the samples collected within 5 m of the shoreline exceeded the DOH standard. As discussed above, these elevated values are the result of mixing of surface water with ocean water in the nearshore zone. Within 10 meters of the shoreline, water quality is within DOH standards.

IV. DISCUSSION and CONCLUSIONS

The purpose of this assessment is to assemble the information to make valid evaluations of the potential for impact to the marine environments from the proposed Hawaii Dairy Farms operation. The information collected in this study provides the basis to understand the processes that are operating in the nearshore ocean, so as to be able to address any concerns that might be raised in the planning process for HDF.

It is important to note that planning for HDF project will utilize best management practices for nutrient generation and runoff stabilization in order to minimize or even reduce sediment discharge to the channel and groundwater that will eventually reach the ocean.

The proposed HDF does not include plans for any direct alteration of the shoreline or offshore areas. Therefore, potential impacts to the marine environment can only be considered from activities on land that may result in delivery of materials (primarily fresh water and nutrients) to the ocean through either infiltration to groundwater with subsequent discharge to the ocean, and surface runoff. To evaluate the possible magnitude of these processes, a report has been prepared by Tom Nance Water Resource Engineering entitled “Estimates of the Potential Impact on Groundwater and Surface Water by Hawaii Dairy Farms in Mahaulepu, Kauai” (TNWRE 2016). The findings of the report are summarized below.

The TNWRE report considers all sources of groundwater and surface water that flow through the project site to the ocean. Based on existing data, the estimated total load of nitrogen from groundwater and surface water leaving the makai end of the HDF site under existing conditions is 1502 pounds per year. Of the total nitrogen, 332 pounds is from groundwater moving through the alluvium and 1170 pounds is from surface water flow. The total load of phosphorus leaving the site is 107 pounds per year, with 27 pounds in groundwater from the alluvium and 80 pounds in surface water. Surface runoff estimates from the HDF site are approximately three times greater than the estimated amounts carried in groundwater moving through the
alluvium. Relative to nutrient loading in most areas in Hawaii, these amounts are very low.

From the perspective of potential nutrient additions to surface and groundwater, the operation of HDF can be characterized as a semi-enclosed loop system: nutrients are taken up by pasture kikuya grass; the cows eat the grass as their primary food supply (they will be fed supplemental grain in the milking parlor); nutrients in the grass consumed by the cows are returned to the ground, either as manure excreted on the pastures or as manure collected in the milking parlor and applied to the pastures. Estimated amounts of nutrient in the manure produced by the cows will not be sufficient to promote growth of pasture grass to maintain the system in steady state. The shortfall of nutrients in the manure to grow the grass will be made up by the application of commercial fertilizer.

In rounded numbers and on an annual basis, HDF will be circulating 490,000 pounds of nitrogen and 87,000 pounds of phosphorus. These amounts are 325 and 815 times greater than the estimates of nitrogen and phosphorus currently carried in surface and groundwater moving through the HDF site that ultimately discharge into the marine environment. At issue is how much of the nitrogen and phosphorus anticipated from manure and from applied commercial fertilizer may leave the site and increase the present nutrient load that ultimately discharges into the nearshore marine environment. There are several aspects to consider in arriving at such an estimate:

• Relative to surface water moving through the site, the groundwater flow in the alluvium is very modest. The formation is poorly permeable and even after HDF is in full operation, its contribution to any increase in groundwater nutrient loads will be significantly less than in surface water.

• A number of design and best management practices are proposed to limit the amount of runoff and to filter the sediment in that runoff. Most significant among these are setbacks, filter strips, and buffer plantings on both sides of drainageways. The herbaceous cover area will be 35 feet wide on both sides of the drainageways.

• Perhaps the biggest factor in controlling nutrient discharge from the site will be the operating practices of HDF personnel to track the nutrient balances in order to avoid excessive use of fertilizer and in anticipating weather patterns to avoid irrigating in advance of heavy, runoff-producing rainfall. It is anticipated that actual runoff into drainageways from HDF’s pastures will occur on less than three (3) percent of days, which is the equivalent of an average of about ten (10) days per year. These runoff-producing rainfall events will be the primary mode of conveyance of nitrogen and phosphorus into drainageways and ultimately into the marine environment.

• As a first order approximation, it is assumed that two (2) percent of the nitrogen and one (1) percent of the phosphorus of the annual production by HDF are carried into the drainageways and/or percolate to the shallow groundwater in the alluvium.
These percentages would amount to 9,800 pounds per year (lb. /yr.) of nitrogen and 870 lb. /yr. of phosphorus. Notably, these amounts would be the same for dairy herd sizes of both 699 and 2,000 cows.

- Compared to the present contribution of nutrients presently passing through the HDF site, these amounts are 330 and 840 times greater than current nitrogen and phosphorus, respectively. These increases would primarily occur during and immediately following runoff producing rainfall events, and would not be a continuous input throughout the year.

Relative to the annual nutrient loading under existing conditions, the potential increases resulting from the operation of HDF are substantial. To provide some perspective, it is instructive to compare the ongoing nutrient additions to the marine environment along the Poipu coastline. These additions include the production of domestic wastewater and the application of fertilizers on the two golf courses and other landscaping in the Poipu area. The potential contributions of nitrogen and phosphorus to the marine environment from these sources can be conservatively estimated as follows:

The total production and disposal of domestic wastewater in the Koloa-Poipu area is on the order of 1.5 MGD. About 1.36 MGD is in DOH-UIC authorized disposal wells. The balance is an approximation of the contribution from household cesspools and septic tank leach field systems. Nitrogen and phosphorus concentrations in the domestic wastewater are estimated at 40 and 10 MG/L, respectively. Ultimately, 15 percent of the nitrogen and two (2) percent of the phosphorus enter the marine environment.

Fertilizer is applied on 400 acres in the Koloa-Poipu area (two golf courses, numerous parks, and other landscaped areas). Fertilizer applications average eight (8) and one (1) pound per 1000 square feet per year. Eight (8) and two (2) percent of the applied nitrogen and phosphorus escape to the groundwater below and are ultimately discharged into the marine environment. These percentages are estimated based on field validation measured from other golf courses in the State of Hawaii in similar coastal settings as the Poipu Courses (Dollar and Atkinson, 1992).

For this set of assumptions, the ongoing input to the marine environment along the Poipu shoreline is about 38,510 lb./yr. for nitrogen and 1,260 lb./yr. for phosphorus. This amount of nitrogen is about 3.8 times (380%) higher than the potential contribution from HDF (10,000 lbs./yr.). For phosphorus, the ongoing discharge from the Poipu area is about 1.4 (140%) times as great as the potential discharge from HDF (900 lb./yr.). In addition, these discharges from Poipu are essentially constant throughout the year in comparison to the episodic discharges from HDF that will only occur as a result of rainfall associated with storm conditions.

For evaluation of the potential effects of the HDF operation, it is important to consider the composition of the receiving waters. The part of Waiopili Ditch that bisects the
HDF site is narrow, highly overgrown by vegetation, and is a man-made feature created for sugar cane irrigation. It does not represent a recreational resource and does not likely provide value as a unique biotic habitat, functioning mainly as a drainageway. The area of the ditch near the junction with the ocean consists of a deep muddy basin that connects to the ocean through a shallow channel that flows through beach sand. The nearshore marine environment consists of a shallow intertidal reef flat that terminates in a reef crest that slopes sharply on the seaward side to sand and rubble flats. The intertidal reef flat where surface water mixes with ocean water is consistently subjected to substantial wave action and current flow to the west. Owing to shallow depth and almost continuous rough water conditions, the reef flat where mixing occurs can be considered dangerous for humans to use, and does not represent an area of safe or unique recreational use. Measurements made of water chemistry in the marine environment on a rare day of low wind and wave action indicated that mixing of surface water in the ocean occurs rapidly within a short distance of the shoreline. During periods of more typical tradewind weather with larger waves breaking on the reef crest, the zone of mixing would be even more restricted within the nearshore area. While these measurements were made during a period of dry weather, it is likely that the zone of mixing in the ocean would not be significantly different during higher surface water flow, as wind and surf conditions would likely also increase during storm condition.

Combining these results with the estimates of changes to surface drainage (there are no changes to groundwater discharge) during HDF operations, it can be concluded that the project will not cause substantial effects to marine water quality beyond the immediate area of merging of surface and ocean water near the shoreline. Analyses of surface water quality indicates that while there are presently increases to nutrient concentrations at sampling sites within the HDF property, these increases drop back to levels that occur mauka of the property at stations near the shoreline. Nutrient subsidies to surface drainage should only occur during occasional episodic rainfall events estimated to occur no more than ten days per year. Any increases to surface water nutrient and sediment concentrations resulting from HDF operations should be limited to occur only during these episodes of heavy rainfall. Extreme physical factors in the marine receiving environment should result in mixing of surface water to background marine conditions within a small area near the point of discharge from the ditch.

Measurements of indicator bacteria in the surface water flow reveal elevated numbers under the present conditions that include no dairy cattle. As a result, it can be concluded that these bacterial counts are the result of existing “natural conditions.” Like other constituents of water chemistry, indicator bacteria counts decrease rapidly in the marine environment within a small area close to the point of discharge. The rapid decrease in bacterial counts following discharge of surface water to the ocean is likely the result of both physical mixing (i.e., dilution), and toxicity from saline waters. There is no reason to expect that these factors will not continue to keep bacterial counts low in the marine environment.
It is also important to consider that, on an annual basis, ongoing processes in the Poipu area of golf course fertilization and domestic sewage disposal continually discharge up to 3.8 times nitrogen and 1.4 times phosphorus to the marine environment relative to the episodic discharges projected from the HDF operation. This discharge occurs along the entire length of the Poipu coastline, rather than as the limited point source discharge at the mouth of Waiopili Ditch draining Mahaulepu Valley. As noted above, the point of discharge of Waiopili Ditch is not a safe area for marine activities, and does not represent a recreational site. Hence, the potential for impacts to the marine environment from the HDF operation in the confined area of the ditch discharge is small or non-existent in comparison to the potential for impacts associated with ongoing functioning of the Poipu community.

V. SUMMARY

1. Evaluation of water chemistry and indicator bacteria were carried out during six surveys from October 2014 to July 2015 in the section of Waiopili Ditch extending from the mauka boundary of the proposed Hawaii Dairy Farms (HDF) in Mahaulepu, Kauai, across agricultural lands Makai, and to the ocean. In addition, marine water chemistry was evaluated during a field survey which consisted of sampling along four ocean transects downgradient of the HDF site that extended from the shoreline to a distance offshore deemed to be beyond the influence of land. All surveys included analysis of water chemistry constituents listed in State of Hawaii Department of Health water quality standards.

2. With the exception of Silica (Si), surface water samples revealed relatively consistent patterns for all nutrient constituents (NO₃⁻, PO₄³⁻, NH₄⁺, TN, and TP). Concentrations of these nutrients were lowest at the stations outside the upper mauka HDF site, increased at stations located within the HDF site, and returned to low levels between the makai end of the site and the ocean. The concentrations of Si displayed a different pattern, with the highest values at mauka sampling stations that steadily decreased closer to the ocean. As Si is typically higher in groundwater than in surface water, the observed pattern for Si indicates that the groundwater contribution to surface water is highest at the mauka end of the property, and decreases through the HDF site and downgradient towards the ocean.

3. As no dairy cows were on site before or during the sampling, the elevated nutrients sampled in the central region are the result of input from existing sources on the property that likely include feral animals, farm animals or crop fertilization in Mahaulepu Valley. The elevated concentrations may also be a result of lower flow in the central sector of the channel resulting in longer residence time. However, the observation that elevated nutrients return to near background levels at stations makai of the HDF site suggest that the inputs are small and localized.
4. Analysis of water chemistry constituents sampled in the marine environment indicates two major patterns. Small elevations of inorganic nutrients (Si, NO$_3^-$, PO$_4^{3-}$, TN, and TP) along with corresponding decreases in salinity along the Mahaulepu shoreline indicate only a small input of groundwater to the ocean. While detectable in the nearshore area, groundwater nutrient input is mixed to background oceanic values within meters of the shoreline.

5. At the marine sampling station at the juncture of Waiopili Ditch and the ocean, steep gradients of nutrients, salinity, Chl a and turbidity were observed. These gradients were the result of a narrow zone of mixing of surface water and ocean water in the intertidal region of the reef flat. Typical oceanographic conditions with tradewind-generated seas and long-period swells breaking on the reef platform result in rapid mixing and dilution of surface water constituents within a narrow zone that only extends several meters from the shoreline. As a result, input from surface water is highly restricted in terms of spatial distribution and effects to the marine environment.

6. Counts of indicator bacteria (Enterococcus, Clostridium) in surface water samples and nearshore marine samples indicate no repetitive pattern: counts were high and variable within surface water sites and between times of sampling. As no dairy cow activities existed during the sampling, the high levels of indicator bacteria are the result of naturally occurring sources (feral animals), as well as other existing land uses including crop fertilization.

7. Counts of indicator bacteria decreased substantially in samples collected in the nearshore ocean in the zone where surface water from Waiopili Ditch mixed with marine waters. The rapid decrease is likely a result of both physical mixing of water masses and toxicity to bacteria from saline water. In any event, the elevated levels of indicator bacteria found in surface water samples do not extend beyond the shoreline.

8. Evaluations of changes to groundwater and surface water flux and composition resulting from the project performed by Tom Nance Water Resource Engineering. In rounded numbers and on an annual basis, HDF will be cycling 490,000 pounds of nitrogen and 87,000 pounds of phosphorus annually through the system in terms of nutrient uptake in grass, excretion by dairy cows, and application on pastures as nutrient sources for pasture grass. These amounts are 330 and 840 times greater than the estimates of nitrogen and phosphorus currently carried in surface and groundwater moving through the HDF site that ultimately discharges into the marine environment. Hence, during dairy operations, cycling of nutrients through the essentially closed system will be far greater than occurs at present.

9. However, as a first order approximation, it is calculated that only two (2) percent of the nitrogen and one (1) percent of the phosphorus of the annual production by HDF
will be lost from the internal cycle, and actually be conveyed beyond the dairy boundaries into the drainageways. The mechanisms for the significant reduction in nutrient transport to the ocean include implementation of design and best management practices that will limit the amount of runoff, and tracking nutrient balances in order to avoid excessive use of fertilizer. It is anticipated that actual runoff into drainageways from HDF’s pastures will on an average of about ten days per year. These episodic runoff-producing rainfall events will be the primary mode of conveyance of nitrogen and phosphorus into drainageways and ultimately into the marine environment. Compared to the present contribution of nutrients presently passing through the HDF site, these additions would represent about seven and nine-fold increases of nitrogen and phosphorus, respectively.

10. A comparison to ongoing nutrient additions to the marine environment along the Poipu coastline from the production of domestic wastewater and the application of fertilizers on the two golf courses and other landscaping in the Poipu area indicates that these sources contribute about 3.8 times (380%) more nitrogen and 1.4 (140%) times more phosphorus than the potential discharge from HDF. The Poipu discharges are essentially constant throughout the year, and occur across the entire coastline, including areas of high recreational use. On the other hand, the HDF discharges are episodic, occurring only several times per year, and are restricted to a single small area of discharge at a site not suitable for recreational use.

11. As a result of these findings, it can be concluded that as long as BMP’s and other operational practices perform as anticipated in minimizing excess nutrients from leaving the HDF site, all indications are that there is little evidence that operation of the Hawaii Dairy Farm will result in any substantial changes to the marine environment.

12. The water chemistry and indicator bacterial studies conducted for this report can serve as an initial baseline for any monitoring programs that may be required for the Hawaii Dairy Farms.
REFERENCES CITED


FIGURE 1. Map of Mahaulepu area of Kauai, Hawaii showing boundaries of Hawaii Dairy Farm property. Also shown are locations of sampling stations 1-12 in Waiopili Stream as well as four ocean sampling transects (T-1 through T-4). Transect T-1 serves as a control that is removed from the influence of discharge from Waiopili Stream. Transect T-4 originates at the mouth of Waiopili Stream.

Legend
- Potable/Monitoring Well
- Monitoring Well
- Surface Water Monitoring Site
- Ocean Sampling Transect
- Project Boundary

Source: USGS Topo Quad, 2013.
FIGURE 2. Plots of nitrate nitrogen, phosphate phosphorus and silica collected on six occasions from surface water sampling sites from the most mauka area of the Hawaii Dairy Farm through agricultural lands to the ocean. Samples labeled "OCN" are collected at the juncture of Waiopili Ditch and the ocean. For locations of surface water sampling sites, and dates of sampling, see Figure 1 and Table 1.
FIGURE 3. Plots of ammonium nitrogen, total nitrogen and total phosphorus collected on six occasions from surface water sampling sites from the most mauka area of the Hawaii Dairy Farm through agricultural lands to the ocean. Samples labeled "OCN" are collected at the juncture of Waiopili Ditch and the ocean. For locations of surface water sampling sites, and dates of sampling, see Figure 1 and Table 1.
FIGURE 4. Plots of salinity, turbidity, and Chlorophyll a collected on six occasions from surface water sampling sites from the most mauka area of the Hawaii Dairy Farm through agricultural lands to the ocean. Samples labeled "OCN" are collected at the juncture of Waiopili Ditch and the ocean. For locations of surface water sampling sites, and dates of sampling, see Figure 1 and Table 1.
FIGURE 5. Plots of pH, Total organic nitrogen and Total organic phosphorus collected on six occasions from surface water sampling sites from the most mauka area of the Hawaii Dairy Farm through agricultural lands to the ocean. Samples labeled "OCN" are collected at the juncture of Waiopili Ditch and the ocean. For locations of surface water sampling sites, and dates of sampling, see Figure 1 and Table 1.
FIGURE 6. Plots of dissolved nutrients in surface (S) and deep (D) samples collected along four transects downgradient of Mahaulepu Valley, Kauai collected on October 6, 2014 as functions of distance from the shoreline. Transect 3 originated at the shoreline where Waiopili Ditch meets the ocean. For locations of transects, see Figure 1.
FIGURE 7. Plots of physical properties of seawater in surface (S) and deep (D) samples collected along four transects downgradient of Mahaulepu Valley, Kauai collected on October 6, 2014 as functions of distance from the shoreline. Transect 3 originated at the shoreline where Waiopili Ditch meets the ocean. For locations of transects, see Figure 1.
FIGURE 8. Mixing diagram showing concentration of dissolved nutrients from ocean samples collected downgradient of Mahaulepu Valley, Kauai. Data points show concentrations as functions of salinity along four transects collected on October 6, 2014. Straight lines in each plot are conservative mixing lines constructed by connecting the endpoint concentrations in open ocean water with water from groundwater monitoring wells located on the Hawaii Dairy Farm site (solid line) and from surface water from Waipio Ditch sampling station 12 (dashed line). For locations of sampling transects, see Figure 1.
TABLE 1. Results of surface water chemistry sampling in the vicinity of the site of the Hawaii Dairy Farm (HDF)
collected on six occasions in 2014-15. Surface water samples were collected at 12 locations from mauka of
the HDF site and along Waiopili Ditch to the coastal area (Sampling sites 1-12). "BEACH" indicates ditch flow
across the beach prior to reaching the ocean. "OCEAN" indicates samples collected makai of the coastal
shoreline. Nutrient concentrations are shown in micromolar units (µM). "bdl" indicates below detection level.
For locations of sampling sites, see Figure 1.
14-Oct-14

NO3-+NO2(µM)

NH4+
(µM)

Si

TOP

TON

TP

TN

TURB

SALT

pH

Chl-a

SITE

PO43(µM)

(µM)

(µM)

(µM)

(µM)

(µM)

(NTU)

(ppt)

(rel)

(µg/l)

1

0.10

0.05

1.70

479.45

0.40

7.55

0.50

9.30

1.24

0.203

6.647

0.054

3

0.05

0.10

1.65

315.35

0.45

5.30

0.50

7.05

3.02

0.274

7.057

13.744

4

0.05

6.00

1.30

316.00

0.40

0.90

0.45

8.20

0.91

0.165

6.609

0.413

5

0.45

0.60

1.75

234.95

0.35

15.15

0.80

17.50

38.5

0.315

7.582

3.932

5A

0.10

3.05

2.00

248.80

0.70

8.40

0.80

13.45

4.86

0.166

7.676

0.987

7

0.35

0.50

1.40

209.90

0.45

11.70

0.80

13.60

28.9

0.113

7.579

3.241

8

1.45

1.70

10.15

175.25

0.85

3.60

2.30

15.45

68.4

0.121

7.190

114.90

9

0.95

1.30

3.95

192.90

0.10

6.55

1.05

11.80

48.0

0.124

7.939

13.25

10

0.15

3.85

0.40

245.55

0.50

3.60

0.65

7.85

19.6

0.167

7.501

3.321

11

0.25

4.45

0.90

209.65

0.40

3.05

0.65

8.40

35.3

0.114

7.556

4.246

12

0.20

4.15

1.05

211.05

0.45

1.80

0.65

7.00

43.5

0.113

7.633

3.142

SAMPLING

29-Oct-14
SAMPLING

PO4

NO3

NH4

Si

TOP

TON

TP

TN

TURB

SALT

pH

Chl-a

SITE

(µM)

(µM)

(µM)

(µM)

(µM)

(µM)

(µM)

(µM)

(ntu)

(ppt)

(rel)

(µg/l)

1

0.05

0.05

0.33

377.48

0.38

18.90

0.43

19.28

1.32

0.222

7.551

0.117

2

0.05

bdl

0.10

417.73

0.25

11.65

0.30

11.75

0.78

0.157

7.497

0.224

3

0.05

0.03

0.20

305.55

0.28

13.88

0.33

14.10

2.51

0.267

7.588

10.314

4

0.18

12.43

0.50

291.48

0.13

10.78

0.30

23.70

0.98

0.181

7.246

1.293

5

0.63

0.15

2.75

274.25

0.28

38.93

0.90

41.83

35.3

0.299

7.501

10.970

5A

0.23

7.00

0.80

270.75

0.18

15.28

0.40

23.08

2.78

0.191

7.910

0.458

7

0.33

2.28

0.60

193.68

0.35

18.40

0.68

21.28

16.6

0.098

8.167

2.917

8

4.25

0.23

51.70

219.00

0.05

75.35

4.30

127.28

193.0

0.168

7.378

59.25

9

0.33

0.20

0.55

193.43

0.43

25.48

0.75

26.23

21.7

0.100

8.049

3.98

10

0.25

6.48

0.93

272.48

0.25

19.05

0.50

26.45

4.8

0.185

7.888

0.826

11

0.43

0.75

0.75

200.08

0.63

18.58

1.05

20.08

37.3

0.103

7.921

2.953

12

0.58

0.35

0.85

197.43

0.23

21.28

0.80

22.48

42.5

0.114

7.985

2.738

11-Nov-14
SAMPLING

PO4

NO3

NH4

Si

TOP

TON

TP

TN

TURB

SALT

pH

Chl-a

SITE

(µM)

(µM)

(µM)

(µM)

(µM)

(µM)

(µM)

(µM)

(ntu)

(ppt)

(rel)

(µg/l)

1

0.30

0.03

2.25

377.13

0.25

11.15

0.55

13.43

0.86

0.264

7.374

0.233

2

0.25

bdl

0.63

401.05

0.23

5.53

0.48

6.15

0.98

0.161

7.580

0.144

3

0.13

0.03

0.45

286.18

0.23

8.43

0.35

8.90

7.68

0.260

7.187

3.573

4

0.18

13.00

0.53

288.85

0.33

6.83

0.50

20.35

1.20

0.175

6.933

0.583

5

1.80

3.73

11.48

286.48

0.83

42.65

2.63

57.85

176.0

0.269

7.249

7.433

5A

0.60

7.35

3.08

265.45

0.13

13.20

0.73

23.63

8.15

0.173

7.559

1.239

7

0.35

0.78

0.48

197.95

0.45

14.78

0.80

16.03

15.4

0.105

7.779

2.235

8

1.80

3.45

3.20

199.28

0.98

40.63

2.78

47.28

112.0

0.159

7.145

80.52

9

0.40

0.80

0.33

195.13

0.55

16.98

0.95

18.10

19.6

0.111

7.599

3.46

10

0.23

7.35

0.03

262.85

0.40

13.53

0.63

20.90

6.7

0.175

7.592

1.014

11

0.30

2.00

0.28

202.08

0.90

15.88

1.20

18.15

20.1

0.121

7.609

2.630

12

0.33

1.60

0.43

201.68

0.83

17.20

1.15

19.23

27.3

0.122

7.652

3.716

4-Mar-15
SAMPLING

PO4

NO3

NH4

Si

TOP

TON

TP

TN

TURB

SALT

pH

Chl-a

Entero

SITE

(µM)

(µM)

(µM)

(µM)

(µM)

(µM)

(µM)

(µM)

(ntu)

(ppt)

(rel)

(µg/l)

(#/100 ml)

5

1.45

0.15

1.58

204.58

0.50

49.48

1.95

51.20

68.1

0.135

7.795

27.155

270

8

1.73

0.50

2.00

203.73

0.40

42.50

2.13

45.00

52.7

0.137

7.532

15.620

60

7

0.55

0.10

0.45

219.83

0.10

22.50

0.65

23.05

25.7

0.119

8.119

4.120

590

9

1.05

1.33

3.28

199.40

0.55

35.73

1.60

40.33

40.0

0.126

7.747

15.359

600

10

0.35

4.20

0.23

232.18

0.25

22.93

0.60

27.35

19.5

0.128

7.912

2.145

740

5A

0.43

3.20

0.88

225.33

0.13

19.48

0.55

23.55

16.0

0.124

7.936

1.688

100

11

0.85

3.53

0.95

197.83

0.08

24.10

0.93

28.58

28.7

0.120

7.884

6.158

<1

12

0.93

3.53

1.48

198.25

0.08

23.75

1.00

28.75

31.6

0.123

7.995

7.083

780

OCEAN

0.53

2.05

1.08

103.35

0.23

17.00

0.75

20.13

9.21

16.330

8.168

3.896

<1

OCEAN

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0.18

0.35

2.40

0.28

9.95

0.53

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#### 8-May-15

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#### 9-Jul-15

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<th>SI (µM)</th>
<th>TOP (µM)</th>
<th>TN (µM)</th>
<th>TURB (nlt)</th>
<th>SALT (ppt)</th>
<th>pH</th>
<th>Chl-a (µg/l)</th>
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TABLE 2. Results of surface water chemistry sampling in the vicinity of the site of the Hawaii Dairy Farm (HDF)
collected on six occasions in 2014-15. Surface water samples were collected at 12 locations from mauka of
the HDF site and along Waiopili Ditch to the coastal area (Sampling sites 1-12). "BEACH" indicates ditch flow
across the beach prior to reaching the ocean. "OCEAN" indicates samples collected makai of the coastal
shoreline. Nutrient concentrations are shown in units of micrograms per liter (µg/L). "bdl" indicates below
detection level. For locations of sampling sites, see Figure 1.
14-Oct-14

NO3-+NO2(µg/L)

NH4+
(µg/L)

Si

TOP

TON

TP

TN

TURB

SALT

pH

Chl-a

SITE

PO43(µg/L)

(µg/L)

(µg/L)

(µg/L)

(µg/L)

(µg/L)

(NTU)

(ppt)

(rel)

(µg/l)

1

3.10

0.70

23.80

13425

12.40

105.70

15.50

130.20

1.24

0.203

6.647

0.054

3

1.55

1.40

23.10

8830

13.95

74.20

15.50

98.70

3.02

0.274

7.057

13.744

4

1.55

84.00

18.20

8848

12.40

12.60

13.95

114.80

0.91

0.165

6.609

0.413

5

13.95

8.40

24.50

6579

10.85

212.10

24.80

245.00

38.5

0.315

7.582

3.932

5A

3.10

42.70

28.00

6966

21.70

117.60

24.80

188.30

4.86

0.166

7.676

0.987

7

10.85

7.00

19.60

5877

13.95

163.80

24.80

190.40

28.9

0.113

7.579

3.241

8

44.95

23.80

142.10

4907

26.35

50.40

71.30

216.30

68.4

0.121

7.190

114.90
13.25

SAMPLING

9

29.45

18.20

55.30

5401

3.10

91.70

32.55

165.20

48.0

0.124

7.939

10

4.65

53.90

5.60

6875

15.50

50.40

20.15

109.90

19.6

0.167

7.501

3.321

11

7.75

62.30

12.60

5870

12.40

42.70

20.15

117.60

35.3

0.114

7.556

4.246

12

6.20

58.10

14.70

5909

13.95

25.20

20.15

98.00

43.5

0.113

7.633

3.142

29-Oct-14
SAMPLING

PO4

NO3

NH4

Si

TOP

TON

TP

TN

TURB

SALT

pH

Chl-a

SITE

(µg/L)

(µg/L)

(µg/L)

(µg/L)

(µg/L)

(µg/L)

(µg/L)

(µg/L)

(ntu)

(ppt)

(rel)

(µg/l)

1

1.55

0.70

4.55

10569

11.63

264.60

13.18

269.85

1.32

0.222

7.551

0.117

2

1.55

bdl

1.40

11696

7.75

163.10

9.30

164.50

0.78

0.157

7.497

0.224

3

1.55

0.35

2.80

8555

8.53

194.25

10.08

197.40

2.51

0.267

7.588

10.314

4

5.43

173.95

7.00

8161

3.88

150.85

9.30

331.80

0.98

0.181

7.246

1.293

5

19.38

2.10

38.50

7679

8.53

544.95

27.90

585.55

35.3

0.299

7.501

10.970

5A

6.98

98.00

11.20

7581

5.43

213.85

12.40

323.05

2.78

0.191

7.910

0.458

7

10.08

31.85

8.40

5423

10.85

257.60

20.93

297.85

16.6

0.098

8.167

2.917

8

131.75

3.15

723.80

6132

1.55

1054.90

133.30

1781.85

193.0

0.168

7.378

59.25

9

10.08

2.80

7.70

5416

13.18

356.65

23.25

367.15

21.7

0.100

8.049

3.98

10

7.75

90.65

12.95

7629

7.75

266.70

15.50

370.30

4.8

0.185

7.888

0.826

11

13.18

10.50

10.50

5602

19.38

260.05

32.55

281.05

37.3

0.103

7.921

2.953

12

17.83

4.90

11.90

5528

6.97

297.85

24.80

314.65

42.5

0.114

7.985

2.738

11-Nov-14
SAMPLING

PO4

NO3

NH4

Si

TOP

TON

TP

TN

TURB

SALT

pH

Chl-a

SITE

(µg/L)

(µg/L)

(µg/L)

(µg/L)

(µg/L)

(µg/L)

(µg/L)

(µg/L)

(ntu)

(ppt)

(rel)

(µg/l)

1

9.30

0.35

31.50

10560

7.75

156.10

17.05

187.95

0.86

0.264

7.374

0.233

2

7.75

bdl

8.75

11229

6.98

77.35

14.73

86.10

0.98

0.161

7.580

0.144

3

3.88

0.35

6.30

8013

6.98

117.95

10.85

124.60

7.68

0.260

7.187

3.573

4

5.43

182.00

7.35

8088

10.08

95.55

15.50

284.90

1.20

0.175

6.933

0.583

5

55.80

52.15

160.65

8021

25.58

597.10

81.38

809.90

176.0

0.269

7.249

7.433

5A

18.60

102.90

43.05

7433

3.88

184.80

22.48

330.75

8.15

0.173

7.559

1.239

7

10.85

10.85

6.65

5543

13.95

206.85

24.80

224.35

15.4

0.105

7.779

2.235

8

55.80

48.30

44.80

5580

30.23

568.75

86.03

661.85

112.0

0.159

7.145

80.52

9

12.40

11.20

4.55

5464

17.05

237.65

29.45

253.40

19.6

0.111

7.599

3.46

10

6.98

102.90

0.35

7360

12.40

189.35

19.38

292.60

6.7

0.175

7.592

1.014

11

9.30

28.00

3.85

5658

27.90

222.25

37.20

254.10

20.1

0.121

7.609

2.630

12

10.08

22.40

5.95

5647

25.58

240.80

35.65

269.15

27.3

0.122

7.652

3.716

4-Mar-15
SAMPLING

PO4

NO3

NH4

Si

TOP

TON

TP

TN

TURB

SALT

pH

Chl-a

Ent

SITE

(µg/L)

(µg/L)

(µg/L)

(µg/L)

(µg/L)

(µg/L)

(µg/L)

(µg/L)

(ntu)

(ppt)

(rel)

(µg/l)

(#/100 ml)

5

44.95

2.10

22.05

5728

15.50

692.65

60.45

716.80

68.1

0.135

7.795

27.155

270

8

53.48

7.00

28.00

5704

12.40

595.00

65.88

630.00

52.7

0.137

7.532

15.620

60

7

17.05

1.40

6.30

6155

3.10

315.00

20.15

322.70

25.7

0.119

8.119

4.120

590
600

9

32.55

18.55

45.85

5583

17.05

500.15

49.60

564.55

40.0

0.126

7.747

15.359

10

10.85

58.80

3.15

6501

7.75

320.95

18.60

382.90

19.5

0.128

7.912

2.145

740

5A

13.18

44.80

12.25

6309

3.88

272.65

17.05

329.70

16.0

0.124

7.936

1.688

100

11

26.35

49.35

13.30

5539

2.33

337.40

28.68

400.05

28.7

0.120

7.884

6.158

<1

12

28.68

49.35

20.65

5551

2.33

332.50

31.00

402.50

31.6

0.123

7.995

7.083

780

OCEAN

0.53

2.05

1.08

103

0.23

17.00

0.75

20.13

9.21

16.330

8.168

3.896

<1

OCEAN

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0.18

0.35

2.40

0.28

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0.53

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0.34

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0.494

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#### 9-Jul-15

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TABLE 3. Results of water chemistry sampling of nearshore marine waters off the Mahaulepu watershed on October 6, 2014. Samples were collected along four transects downgradient of Mahaulepu Valley, and extended from the highest wash of waves on the beach to the open coastal ocean approximately 200 meters from shore. Two samples were collected at each of 16 locations on each ocean transect. The sample collected at the shoreline of Transect 3 was from the point that Waiopili Ditch stream meets the ocean. Nutrient concentrations are shown in micromolar units (µM). Also shown are State of Hawaii Dept. of Health Water Quality Standards for Open Coastal waters under dry conditions. Shaded values are greater than "not to exceed more than 10% of the time" criteria. Abbreviations are as follows: DFS=distance from shore; BDL = below detection limit. "S" indicates surface sample; "D" indicates deep bottom sample. For locations of survey transects and sample sites, see Figure 1.

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DOH WQS OPEN COASTAL WATERS (DRY)

Geometric Mean 0.25 0.14 0.52 7.86 0.20 0.15
NTE 10% 0.71 0.36 0.97 12.86 0.50 0.50
### TABLE 4. Results of water chemistry sampling of nearshore marine waters off the Mahaulepu watershed on October 6, 2014.

Samples were collected along four transects downgradient of Mahaulepu Valley, and extended from the highest wash of waves on the beach to the open coastal ocean approximately 200 meters from shore. Two samples were collected at each of six locations on each ocean transect. One sample was collected just below the ocean surface, and one just above the ocean floor (on each transect site 1 on was located at the beach-water interface and only a single sample was collected). The sample collected at the shoreline of Transect 3 was from the point that Waipio Ditch stream meets the ocean. Nutrient concentrations are shown in milligrams per liter (mg/L). Also shown are State of Hawaii Dept. of Health Water Quality Standards for Open Coastal waters under dry conditions. Shaded values are greater than "not to exceed more than 10% of the time" criteria. Abbreviations are as follows:

- DFS = distance from shore
- BDL = below detection limit
- "S" indicates surface sample; "D" indicates deep bottom sample. For locations of survey transects and sample depths see Figure 1.

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APPENDIX G

ARCHAEOLOGICAL INVENTORY SURVEY REPORT,
MAHĀ‘ULEPŪ AHUPUA‘A, KŌLOA DISTRICT,
KAUA‘I ISLAND, HAWAI‘I

SCIENTIFIC CONSULTANT SERVICES, INC.
ARCHAEOLOGICAL INVENTORY SURVEY REPORT
MĀHĀ'ULEPŪ AHUPUA'A, KŌLOA DISTRICT,
KAUA'I ISLAND, HAWAI'I

TMK: (4) 2-9-001:001 POR., (4) 2-9-003:001 por.,
and (4) 2-9-003:006 por.

Prepared by:
Jeff Putzi, B.A.,
James Powell, B.A.,
Milton Ching, A.A.,
and
Michael Dega, Ph.D.

Revised May 2016

DRAFT

Prepared for:
Hawaii Dairy Farms, LLC.
P.O. Box 1690
Kōloa, Kaua‘i, Hawai‘i 96765
ABSTRACT

Scientific Consultant Services, Inc. (SCS), conducted an Archaeological Inventory Survey (AIS) on behalf of Hawaii Dairy Farms, LLC (HDF) in connection with a proposed dairy farm (project) that HDF seeks to develop on 557-acres within Māhā'ulepū Valley, Māhā'ulepū Ahupua’a, Kōloa District, Island of Kaua‘i [TMK: (4) 2-9-001:001 por., (4) 2-9-003-001 por., and 2-9-003:006 por.]. The property comprising the project area is owned by Mahaulepu Farm LLC and leased to HDF for the purpose of developing the proposed dairy farm.

A 100% pedestrian survey was conducted over the entire project area. In addition, through consultation with the State Historic Preservation Division (SHPD), a 100-meter wide zone bordering the northern flanks of the project area was also surveyed. This extended survey area is also owned by Mahaulepu Farm LLC but are not included within the premises leased to HDF. Because the extended survey area is outside HDF's leased premises, HDF was required to obtain permission from Mahaulepu Farm LLC to enter and survey this area. No project impacts are anticipated in this area; thus, the extended survey area is not part of the defined project area although historic properties identified within the extended survey are described in this report.

During the course of the pedestrian survey of both the project area and extended survey area, a total of sixteen historic properties were identified—six of these sites were located within the project area and the remaining ten sites were all located in the extended survey area. All six sites found in the project area are associated with sugar cane cultivation. Of the ten sites located outside the project area, two are associated with pre-Contact and/or early historic times, one of which was previously identified (Site 50-30-10-3094); the remainder of the sites are affiliated with sugar cane cultivation. Because the project will not have impacts outside the project area, and because the sites within the extended survey area are located on lands that HDF has no control over, no further work is recommended for any of these sites at this time. Accordingly, these sites will remain in their existing condition, under the control of landowner Mahaulepu Farm LLC.

In addition to pedestrian survey, a total of seventeen long trenches were mechanically excavated in various portions of the project area, particularly in a portion of the project area which contained a complex of Land Commission Awards. No cultural materials or burials were identified in any of the trenches. Finally, multiple test units were manually conducted in the pre-Contact enclosure (Site 50-30-10-2250) located in the extended survey area, which aided in functional interpretations.

Sites 50-30-10-2250 through -2264 have been assessed as significant under Criterion D (information important in prehistory or history). No further work is recommended for any of the sites in the project area, although adaptive re-use is possible with several sites. Sites -3094 and -2250, both occurring outside the proposed project area, have been assessed as significant under Criterion D and E. No mitigation or further work is recommended herein for any sites occurring outside of the project area, including Sites -3094 and -2250, as they will not be adversely affected by the current project and fall under the purview of Mahaulepu Farm LLC, not HDF.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td></td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>7</td>
</tr>
<tr>
<td>HAWAII DAIRY FARMS PROJECT DESCRIPTION</td>
<td>8</td>
</tr>
<tr>
<td>PROJECT AREA AND EXTENDED SURVEY AREA</td>
<td>13</td>
</tr>
<tr>
<td>LANDFORM, SOILS, AND VEGETATION</td>
<td>14</td>
</tr>
<tr>
<td>TRADITIONAL AND HISTORIC SETTING</td>
<td>21</td>
</tr>
<tr>
<td>PRE-CONTACT ERA</td>
<td>21</td>
</tr>
<tr>
<td>EUROPEAN CONTACT AND THE KAMEHAMEHA DYNASTY</td>
<td>22</td>
</tr>
<tr>
<td>THE REGENCY OF KA’AHUMANU</td>
<td>25</td>
</tr>
<tr>
<td>LAND COMMISSION AWARDS</td>
<td>26</td>
</tr>
<tr>
<td>SUGAR AND THE HISTORIC ERA OF KÔLOA AND MĀHĀʻULEPŪ</td>
<td>34</td>
</tr>
<tr>
<td>PREVIOUS ARCHAEOLOGY</td>
<td>39</td>
</tr>
<tr>
<td>SETTLEMENT PATTERN AND SITE EXPECTATIONS</td>
<td>43</td>
</tr>
<tr>
<td>A PREDICTIVE MODEL OF TRADITIONAL SITE DISTRIBUTION</td>
<td>44</td>
</tr>
<tr>
<td>SITE TYPE PREDICTIONS AND FREQUENCY BY ZONE</td>
<td>44</td>
</tr>
<tr>
<td>SITE DISTRIBUTION AND CHRONOLOGY</td>
<td>48</td>
</tr>
<tr>
<td>METHODOLOGY</td>
<td>49</td>
</tr>
<tr>
<td>FIELD METHODS</td>
<td>49</td>
</tr>
<tr>
<td>LABORATORY METHODS</td>
<td>50</td>
</tr>
<tr>
<td>CONSULTATION</td>
<td>50</td>
</tr>
<tr>
<td>ARCHAEOLOGICAL INVENTORY SURVEY RESULTS</td>
<td>53</td>
</tr>
<tr>
<td>STATE SITE NO. 50-30-10-2250 (TS-1)</td>
<td>57</td>
</tr>
<tr>
<td>STATE SITE NO. 50-30-10-2251 (TS-2)</td>
<td>72</td>
</tr>
<tr>
<td>STATE SITE NO. 50-30-10-2252 (TS-3)</td>
<td>75</td>
</tr>
<tr>
<td>STATE SITE NO. 50-30-10-2253 (TS-4)</td>
<td>79</td>
</tr>
<tr>
<td>STATE SITE NO. 50-30-10-2254 (TS-5)</td>
<td>79</td>
</tr>
<tr>
<td>STATE SITE NO. 50-30-10-2255 (TS-6)</td>
<td>82</td>
</tr>
<tr>
<td>STATE SITE NO. 50-30-10-2256 (TS-7)</td>
<td>87</td>
</tr>
<tr>
<td>STATE SITE NO. 50-30-10-2257 (TS-8)</td>
<td>87</td>
</tr>
<tr>
<td>STATE SITE NO. 50-30-10-2258 (TS-9)</td>
<td>91</td>
</tr>
<tr>
<td>STATE SITE NO. 50-30-10-2259 (TS-10)</td>
<td>91</td>
</tr>
</tbody>
</table>
FIGURE 14. USGS MAP SHOWING LOCATION OF IDENTIFIED HISTORIC PROPERTIES IN THE SURVEYED AREA..........................................................55
FIGURE 15. AERIAL PHOTOGRAPH SHOWING LOCATION OF DITCH, SITE -2251, -2252, -2253, AND -2259..........................................................56
FIGURE 16. LOCATION OF SITE -2250 (OUTSIDE PROJECT AREA)..............................................................................................................58
FIGURE 17. PLAN VIEW OF SITE -2250.........................................................................................................................................................59
FIGURE 18. SITE -2250. VIEW TO SOUTH. ......................................................................................................................................................60
FIGURE 19. SITE -2250. VIEW TO WEST.....................................................................................................................................................61
FIGURE 20. SITE -2250. NOTE UPRIGHTS IN CONSTRUCTION. VIEW TO WEST.............................................................................................62
FIGURE 21. SITE -2250, TU-1 PROFILE. WEST FACE.......................................................................................................................................65
FIGURE 22. SITE -2250, TU-2 PROFILE. NORTH FACE.......................................................................................................................................66
FIGURE 23. TU-4 LOCATION. VIEW TO SOUTH...............................................................................................................................................67
FIGURE 24. SITE -2250, TU-5 PROFILE. WEST FACE.......................................................................................................................................68
FIGURE 25. TU-5 AT BASE OF EXCAVATION. VIEW TO WEST..................................................................................................................................69
FIGURE 26. CHOPPER TOOL FROM TU-9. NOTE: THIS ARTIFACT WAS TAKEN BACK TO THE SITE IN FEBRUARY, 2015 AND PLACED IN THE SAME LOCATION WHERE IT WAS DISCOVERED. .............................................70
FIGURE 27. SITE -2251, FEATURE 1 DITCH AND FEATURE 2 SLUICE GATE. VIEW TO SOUTHEAST............................................................73
FIGURE 28. PLAN VIEW OF SITE -2251, FEATURE 2 SLUICE GATE................................................................................................................74
FIGURE 29. SITE -2252, FEATURE 2 SLUICE GATE. VIEW TO NORTHWEST.....................................................................................................76
FIGURE 30. SITE -2252, FEATURE 1 DITCH AND FEATURE 2 SLUICE GATE. VIEW TO SOUTH..............................................................77
FIGURE 31. SITE -2252, FEATURE 3 SLUICE GATE. VIEW TO SOUTHWEST....................................................................................................78
FIGURE 32. SITE -2254 RETAINING WALL. VIEW TO EAST.............................................................................................................................80
FIGURE 33. PLAN VIEW OF SITE --2254 RETAINING WALL........................................................................................................................81
FIGURE 34. SITES -2254 AND -2255, FEATURE 2. VIEW TO NORTH................................................................................................................83
FIGURE 35. PLAN VIEW OF SITE -2255, FEATURE 2........................................................................................................................................84
FIGURE 36. SITE -2255, FEATURE 3. VIEW TO SOUTH.................................................................................................................................85
FIGURE 37. PLAN VIEW OF SITE -2255, FEATURE 3........................................................................................................................................86
FIGURE 38. PLAN VIEW OF SITE -2256 BRIDGE CONCRETE DECK AND FLOOR........................................................................................88
FIGURE 39. PLAN VIEW OF SITE -2256 BRIDGE RETAINING WALLS.........................................................................................................89
FIGURE 40. SITE -2257 RETAINING WALL REMNANT. VIEW TO SOUTHWEST..........................................................................................90
FIGURE 41. SITE -2258 RESERVOIR. VIEW TO NORTH...............................................................................................................................93
FIGURE 42. SITE -2259 DITCH. VIEW TO WEST............................................................................................................................................94
FIGURE 43. SITE -2260 BRIDGE. VIEW TO WEST.......................................................................................................................................95
FIGURE 44. SITE -2260 BRIDGE DATE. VIEW TO SOUTHWEST......................................................................................................................96
FIGURE 45. PLAN VIEW OF SITE -2260 BRIDGE ATTRIBUTES..................................................................................................................97
FIGURE 46. PLAN VIEW OF SITE -2260 BRIDGE.......................................................................................................................................98
FIGURE 47. SITE -2261 BRIDGE, SHOWING 1908 SECTION AND 1951 SECTION. VIEW TO NORTHEAST..................................................100
FIGURE 48. SITE -2261 BRIDGE DATE. VIEW TO SOUTH............................................................................................................................101
FIGURE 49. SITE -2263 BRIDGE. VIEW TO SOUTH.......................................................................................................................................103
FIGURE 50. PLAN VIEW OF SITE -2263, RETAINING WALLS AND CULVERTS............................................................................................104
FIGURE 51. SITE -2264 CULVERT AND PIPE. VIEW TO NORTHEAST.......................................................................................................105
FIGURE 52. PLAN VIEW OF SITE -2262......................................................................................................................................................108
FIGURE 53. PLAN VIEW OF SITE -2262, FEATURE 2 RETAINING FEATURES..............................................................................................109
FIGURE 54. PLAN VIEW OF SITE -2262, FEATURE 3 RETAINING WALLS............................................................................................110
FIGURE 55. GOOGLE EARTH AERIAL IMAGERY OF SITE -2262 IN RELATION TO SITES -2253 AND -2258.........................................................111
FIGURE 56. SITE -2262 STRUCTURAL SUPPORTS OF THE FLUME. VIEW TO EAST............................................................................................112
FIGURE 57. SITE -2262 NORTH BANK FOUNDATION. VIEW TO NORTH....................................................................................................113
FIGURE 58. SITE -2262 FLUME SYSTEM. VIEW TO NORTHEAST.................................................................................................................114
LIST OF TABLES

Table 1. Site Location and Descriptive Data. ........................................................................................................54
Table 2. Site Descriptive Data, Significance, Recommendations, and Possible Adaptive Re-uses. ....................148
INTRODUCTION

Hawai‘i Dairy Farms LLC (HDF) has leased certain agricultural lands from Mahaulepu Farm LLC (landowner and lessor), located in Māhā‘ulepū Valley, Māhā‘ulepū Ahupua‘a, Kōloa District, Island of Kaua‘i (TMK: (4) 2-9-001:001 por., (4) 2-9-003:001 por., and (4) 2-9-003:006 por.), to establish and operate a dairy farm on the leased property (project) (Figures 1 and 2). It is proposed that the 557-acre leased property will undergo some changes in connection with the development of the project, including: modifying existing dirt roads, grading ground surfaces for the construction of buildings, the excavation of effluent ponds, and the excavation of pipelines for the watering of cattle (Figure 3). Previously the entire project area was utilized for sugar cane cultivation.

At the request of HDF, Scientific Consultant Services, Inc. (SCS) performed an Archaeological Inventory Survey (AIS) of the project area, comprised of the leased premises, along with an extended survey area of approximately 100 meters upslope (Figure 1 and Figure 2). The land within the extended survey area is owned by Mahaulepu Farm LLC, and is not under the control of HDF; accordingly, HDF and SCS had to obtain the permission of the Mahaulepu Farm, LLC to enter those areas. The 557-acre project area, together with the extended survey area, compromise the total surveyed area in this report.

Pursuant to Hawai‘i Revised Statutes (HRS) Chapter 6E and Hawai‘i Administrative Rules (HAR) Chapters 13-284 and 13-276, the AIS was performed to:

- Identify historic properties that may be present in the project area, and given the level of prior disruption of this area, to also identify historic properties in the extended survey area that may provide context and assist in the interpretation of any historic properties in the project area;
- Gather information to evaluate the significance of any newly discovered historic properties;
- Determine what effects, if any, the proposed project would have on any identified significant historic properties; and
- Propose mitigation commitments to address possible adverse effects the project would have on the identified significant historic properties.

SCS conducted a 100% pedestrian survey of the project area and extended survey area. The survey revealed one previously identified historic property, a carved petroglyph boulder (State Site 50-30-10-3094) and 15 newly identified historic properties were documented during the survey. Six sites occur in the project area, and the remaining ten sites were documented in the extended survey area outside of the project area.
Fourteen of the sixteen sites are affiliated with sugar cane cultivation *i.e.*, bridges, ditches, retaining wall remnants, and culverts dating from the late 19th-20th century. All six of the sites within the project area, and eight of the sites that are in the extended survey area, fall within this site classification. The remaining two sites in the extended survey area- an enclosure and three petroglyph features- are associated with pre-Contact and/or early historic times.

In addition to pedestrian survey, a total of seventeen long trenches were mechanically excavated in various portions of the project area, particularly in a portion of the project area which contained a complex of Land Commission Awards. No cultural materials or burials were identified in any of the trenches. Finally, multiple test units were manually placed in the pre-Contact enclosure (Site 50-30-10-2250) in the extended survey area, which aided in refining functional interpretations of that site.

**HAWAII DAIRY FARMS PROJECT DESCRIPTION**

Hawai'i Dairy Farms, LLC (HDF) was formed as a positive step toward the island state's food security, economic diversity, and sustainability. Experimental trials were conducted to determine lands capable of growing nutritious forage for dairy cows, and lands meeting the operational requirements for a dairy operation were identified. Kaua'i was determined to best meet the operational requirements, and Māhā'ulepū Valley was found to provide ideal growing conditions.

At steady-state production with 699 milking cows, the farm will produce roughly 1.2 million gallons annually at market price. HDF will reduce Hawai'i's reliance on imported milk from the mainland United States by increasing current fresh local milk production by approximately 33 percent. The farm will be based on the most successful island dairy models in the world, and will utilize a sustainable, pasture-based rotational-grazing system and 21st century technology. The farm will be very different from conventional feedlot dairy operations.

HDF is committed to establishing a herd of up to 699 mature dairy cows, and demonstrating the pasture-based system as an economically and environmentally sustainable model for Hawai'i. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. The application process for a National Pollutant Discharge

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1 Text for this section provided by Group 70 International.
Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) permit includes public notification and input. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is currently estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.
Figure 1. USGS Koloa Quadrangle of the total surveyed area, comprised of the project area and the extended survey area.
Figure 2. Tax Map Key of the surveyed area, comprised of the project area and the extended survey area.
Figure 3. Proposed dairy facilities within the project area.
PROJECT AREA AND EXTENDED SURVEY AREA

The area of potential effect (APE) of the proposed dairy farm, and thus, the project area, for purposes of the AIS, is comprised of the 557 acres HDF has leased from Mahaulepu Farm, LLC, a subsidiary of Grove Farm Company, Inc. (Grove Farm). When the dairy is operational, the leased property will be fully enclosed by a fencing system that will ensure that all impacts of the project are maintained within the leased area.

At the request of the SHPD, HDF and SCS agreed to include in the AIS an additional area outside the project area, comprised of approximately 100 meters (m) along the northern portion of the valley floor and slightly above, referred to herein as the extended survey area (see Figures 1 and 2). The project is not anticipated to have any impacts in this extended survey area. As the project area was previously used for intensive sugar cane cultivation and is heavily disturbed, it was thought that looking outside the project area could provide additional information that is not readily apparent from its current condition, as well as provide context and information helpful to interpreting sites found within the project area. The project area, together with the extended survey area, is referred to herein as the surveyed area.

Overview of Surveyed Area Location and Environment

The surveyed area is situated entirely within Māhā'ulepū Valley, on the southeastern side of the island of Kaua'i. The surveyed area does not extend up any of the adjacent slopes or ridgelines on the east, or west, and does not extend south beyond Māhā'ulepū Road. The 100 m extended survey area covers additional land along the northern portion of the valley floor, and also reaches slightly up the northern flank of the valley. Informal survey by the SCS crew extended to the top of the eastern and northeastern ridgelines in attempts to locate any trails (see below). Māhā'ulepū Valley is separated by a ridge from Aweoweonui Valley, within Kipu Kai Ahupua'a, to the east. The ridge is of interest because the northern end is composed of basalt, the middle is limestone, and the southern end is composed of the Haula Sand Dunes, near the coastline. The ahupua'a boundary with Kipu Kai crosses this ridge, and the beach front boundary of Māhā'ulepū Ahupua'a extends from Kawelikoa Point in the north to Makahuena Point in the south. Kalapa ridge separates Māhā'ulepū Valley from Paa Valley, an ahupua'a on the west (Figure 4). The north end of Māhā'ulepū Valley is formed by Ha'upu Ridge and dominated by Mount Ha'upu (Figure 5 and Figure 6). There are named peaks on all three ridges. South of the surveyed area lies Kapunakea Pond, a relictual water feature. Māhā'ulepū is literally translated as “and falling together” (Pukui et al. 1974:138), a likely allusion to the ridges bordering the expansive valley.
The surveyed area occurs at an elevation of c. 80 feet amsl to 200 feet amsl and is partially bounded by Māhā’ulepū Road. The road enters the valley along the base of a slope on the western side, extends north, then runs to the east, several hundred meters from the north end of the valley. Traversing the valley, the road then turns south along the eastern ridge slope base, continues the length of the ridge, then turns west, eventually rejoining the entrance. The eastern and western sections of the road form part of the survey area boundaries.

Two parallel dirt roads extend north to south along the center of the valley floor. Both roads have an irrigation ditch parallel to their lengths. Māhā’ulepū Ditch is present on the eastern flank and consists of a modified stream course, the source of which are a series of braided streams at the north end of the valley. These streams enter the valley on the eastern and western sides of the ditch and are referred to as “east stream” and “west stream” in documentation and field notes. The western ditch was constructed in the 20th century and its origins are the Māhā'ulepū Reservoir, at the northwest end of the valley. The reservoir is filled by a series of wells in the immediate vicinity. The ditch does not appear to have originally been a natural stream course that was modified during the Plantation era. This course is referred to here as the Main Ditch. The primary road up the valley is alongside the Main Ditch. This ditch currently feeds the active taro farm at the southern end of the valley. The taro farm borders the southern edge of the project area, but is not within the surveyed area. Smaller ditches run both parallel and perpendicular to the two larger ditches. The Main Ditch and Māhā’ulepū Ditch join south of the project area to form what is then referred to as Waiopili Stream. Waiopili Stream eventually joins a natural spring and the remnants of Kapunakea Pond, then runs by Waiopili Heiau, one of the most significant cultural sites on Kaua'i, and on to the ocean. Land Commission Awards (LCA) along Māhā'ulepū Ditch in the center of the valley are noted as being in Kawailoa Ili, but it is unclear if this stream also went by the same name (see below).

The climate of the surveyed area is not extreme, with rainfall accumulating at an average rate of 53 inches per annum, with average temperatures ranging from 72-86 degrees in the summer and 64-80 degrees in the winter (NPS 2008:7).

LANDFORM, SOILS, AND VEGETATION

The mountain range that flanks the surveyed area to the north and northeast are composed of the most ancient volcanic series in the high islands, the Waimea Canyon Basalts (NPS 2008:11). These formed during the shield-building stage of the Kaua'i volcano, as eruptions gradually built up its sides and widened its base. Most of the range is part of the ancient Napali member of the Waimea series, dating from 4.35 to 5.1 million years ago. The caldera of Mount
Ha'upu is a separate geological feature from the rest of the range and remains undated (Blay and Siemens 2004).

Māhā'ulepū lands below Ha'upu ridge are part of the Kōloa series that cloaks most of the eastern half of Kaua'i. The series formed as the Kaua'i volcano ceased major eruption and began to erode, with occasional small eruptions at lava domes, cinder cones, and spatter cones. These produced a layer of lava that, though not large in mass, nevertheless covered a large area. Kōloa volcanics within the study area at Māhā'ulepū include both underlying lava and visible vents, ranging from 0.5 to 2.0 million years in age (Blay and Siemens 2004).

Portions of the valley's slopes have been identified as Rockland (rRK; Foote et al. 1972: Sheet 32). This is composed of areas where exposed rock covers 25 to 90 percent of the surface. Rock outcrops and very shallow soils are the main characteristics. The rock outcrops are mainly basalt and andesite. This land type topography is characterized as nearly level to very steep. Elevations range from near sea level to more than 6,000 feet, with annual rainfall amounts between 15 to 60 inches. The vegetation at lower elevations consists mainly of *kiawe*, *klu*, *piligress*, Japanese tea and *koa haole*.

Soils on the slopes of the valley are also associated with the KEHF series or Kalapa very rocky silty clay (Foote et al. 1972: Sheet 32). This is a well-drained soil that occurs at the base of slopes and is associated with moderately sloping to very steep topography. Elevations range from 200 to 1,200 feet above sea level, with annual rainfall amounts between 60 to 100 inches. Associated vegetation consists of guava, *lantana*, sensitive plant, *piligiliula*, *ohia*, Japanese tea, and ferns.

Soils within the valley have been classified as LPE or Lualualei Series, composed of extremely stoney clay (Foote et al. 1972: Sheet 32). This series consists of well-drained soils on the coastal plains, alluvial fans, and on talus slopes. They are nearly level and gently sloping. Elevations range from 10 to 125 feet above sea level, with annual rainfall amounts to 50 inches per year. There is a prolonged dry spell during the summer. These soils are associated with sugarcane, truck crops, pasture, wildlife habitat, urban development, and military installations on Kaua'i. Associated vegetation consists of *kiawe*, *koa haole*, bristly foxtail, *uhaloa*, and fingergrass. This soil type, extremely stoney clay, was identified in several trenches during the AIS, with most stratigraphic trenches excavated on the valley floor being composed of a shallow O-horizon overlaying brown/yellow clays. In other words, there are exceptions to the general soil survey.
Figure 4. Project area overview. View to the southwest towards Kalapa ridge.
Figure 5. Project area overview. View to northwest. Note Mount Ha'upu at right.
Figure 6. Project area overview. View to north from center of Māhā'ulepū Valley.
Twelve different soils within Māhāʻulepū Valley are identified on a USGS/USDA Soil Map kindly provided to the field crew by HDF (NRCS 2006; Figure 7). The soils map depicts the various soil regimes across the valley floor; these soil differences are most likely a product of water, whether through transport, ground water, or run-off deposition. During pedestrian survey of areas with sparse or no ground vegetation, the transition of soils was visibly recognizable.

The project area has been utilized for commercial sugar cane cultivation and/or livestock pasturage since the middle of the 19th century and is fairly clear of vegetation. Most of the project area lies fallow with the soils exposed. Some of the areas are covered with grasses up to 0.3 m tall, and smaller areas at the northeast and northwest ends of the valley are 100% covered by grasses up to 2.0 m tall. Within the surveyed area are few scattered koa haole and java plum trees. These occur outside the main valley footprint/project area, which has been extensively cleared for well over a hundred years. The slopes of the valley outside the project area are forested.
Figure 7. Soils of Māhā'ulepū Valley (USDA; Soils NRCS 2006).
TRADITIONAL AND HISTORIC SETTING

Early settlement and agricultural development is thought to have first occurred on the windward sides of the Hawaiian Islands, including Kaua‘i, sometime in the A.D. 900-1000 range during what is known as the Colonization Period (Kirch 2011:22). Most likely arriving from east Polynesia, these early inhabitants brought with them a variety of tools, fishing gear, and household goods. Dogs, pigs and chickens were brought by these Polynesian voyagers for food. The Polynesian rat also arrived with the voyagers, but whether these were intentionally transported as a food source is unclear. Considering that every food crop cultivated by the Polynesians arrived with them, it is evident that these people had considerable knowledge not only regarding how to plant and harvest these crops, but also how to transport the crops' seeds, cuttings, and roots.

Prior to European Contact in 1778, Hawaiians cultivated taro in both irrigated and dry fields. Other dryland agriculture crops included 'uala (sweet potato), uhi (yams), maia (bananas), ipu (gourds), and ko (sugar cane). Grasses were utilized for thatching the roofs of structures and covering floors, which were then covered by hala (pandan) mats. Hala was also used in the making of matting and sails. Important arboreal crops included niu (coconut) and ulu (breadfruit). Other trees were utilized for the construction of canoes, house frames, tools, and weapons. Kapa cloth from wauke (paper mulberry) was also tended. There were a variety of medicinal plants utilized and plants, such as olona, grown to provide fibers for making cordage (Handy and Handy 1972).

Hawaiian aquaculture was extensive, and included the construction and maintenance of coastal and riverine fish ponds. Fishing ranged from shoreline to pelagic, with different strategies for each. In order to maintain and benefit from all of these resource zones, Hawaiian polities were organized into ahupua‘a, which gave residents access to a wide array of resources extending from mountain top forests to deep sea fishing zones. An ahupua‘a was an ancient land division that ran from the ocean to the mountains and allowed those living there to proffer from all the different environmental zones of the land. Ahupua‘a boundaries could expand, contract, appear, and disappear, depending upon political events. Given the size of Māhā'ulepū Valley, Māhā'ulepū Ahupua‘a was highly valued.

PRE-CONTACT ERA

Initial Polynesian settlement of Kaua‘i occurred in the resource-rich regions surrounding Wailua River on the east coast; the equally verdant Waimea River region on the southern coast; and the Hanalei region on the north coast (Joesting 1984). As with all the Hawaiian Islands, each district and region was eventually settled. These settlements developed into polities which allied,
warred, and co-existed with one another until Kaua'i came under unified rule of a single king. This process occurred in different stages on different islands. Because of the relative distance of Kaua'i from O'ahu, Moloka'i, Maui, Lana'i, and Hawai'i Island, the polities of Kaua'i and her neighbor Ni'ihau became their own entity, while the other islands struggled first for internal control and later, for the conquest and rule of several, and ultimately all, the islands.

The primary residence of the high king was in the Wailua River region of Kaua'i, with miles of cultivated lands, mountain resources, religious sites, and shoreline to pelagic fishing. Broad stretches of beach allowed for canoe landings but there was no deep water anchorage, despite the presence of the Wailua River.

Initial settlement is presumed near the coastline in the A.D. 1000-1200 range, with expansion inland during the A.D. 1400-1600s, as was typical across the islands (see Kirch 1985). Agricultural field systems were created at these inland areas, closer to fresh water resources and soil more amenable to kalo and sweet potato production. Permanent habitation locales were present from the coast to this more inland area, with ceremonial sites, walls, and other associated structures being built. Within the mountainous areas, such as at the back of Māhā'ulepū Valley, temporary habitation loci such as rock shelters/caves or small enclosures (C-shapes) were utilized by those gathering upland resources. The middle zone, between the coastlines and mountains, such as Māhā'ulepū, was ideal for agriculture and homesteads, as witnessed by the numerous LCA's occurring in a small section of the valley later. However, historic land use obliterated much of the archaeological signatures for these settlements.

In early 1778 Captain James Cook and the two ships under his command, H.M.S. Resolution and H.M.S. Discovery arrived off of Kaua'i. Finding that they could not make land fall at Wailua, Cook continued westward until reaching Waimea. This would be the beginning of contact between Europeans and Hawaiians (Salmond 2003).

EUROPEAN CONTACT AND THE KAMEHAMEHA DYNASTY

The third voyage commanded by Captain Cook was undertaken primarily to discover the fabled Northwest Passage, which supposedly linked the Pacific, Arctic, and Atlantic Oceans. As he had during previous journeys, Cook visited Tahiti and it was from there that he set out for the northern Pacific coast of North America.

The voyage put him within sight of the island of O'ahu, but adverse winds prevented his arrival. Continuing on to Kaua'i, he sighted Wailua, but could not make landfall. The ships continued southwest and then westward, past Mount Ha'upu and Māhā'ulepū Valley. Both were
sketched and drawn by expedition artist John Webber, the first European artwork to depict a Hawaiian Island.

Cook found a manageable anchorage at the mouth of Waimea River. Several trips ashore by him and a select group of his officers, marines, and crew led to generally good relations with the Hawaiians. It is unclear what Cook and the others learned about the politics of Kaua‘i and her eastern neighbor. It is probable that at this time (1778) Kaeokulani was ruler of Kaua‘i. He was of high rank, a chief born on Maui, and the half-brother of the paramount king of Maui, Kahekili.

After a short time on Kaua‘i in the early months of 1778, Cook departed to continue the search for the Northwest Passage. A year passed after which Cook returned to the Hawaiian Islands. This time, Maui was sited and briefly visited, but the island of Hawai‘i became the focus of the remainder of the voyage of Cook and ultimately of his demise, at Kealakekua Bay (Salmond 2003).

After the death of Cook, the journey continued, now under the command of Captain Clerke. The ship passed O‘ahu, and returned to Waimea, Kaua‘i. After their departure a short time later, it would not be until 1786 that Europeans returned to the Hawaiian Islands, with Waimea (Kaua‘i) receiving her share of British and American vessels focusing on the lucrative fur trade in the Pacific Northwest. These visits coincided with, and perhaps accelerated, the growing conflict for control of the eastern islands.

Beginning in approximately 1790, battles on and around Maui, Moloka‘i, and Hawai‘i Island between several rulers occurred with increasing ferocity. Safely in control of Kaua‘i, Kaeokulani became a participant, bringing fleets of warriors to assist his half-brother on Maui. Many European and American ship captains had contact with all the rivals, and a fairly coherent chronology of events is known. What certainly is known is that Kaeokulani was killed during a battle in Honolulu in 1794 while fighting his nephew Kalanikupule, who had taken rule of Maui and O‘ahu upon the death of his father Kahekili in Waikiki, several years earlier in 1791 (Ridley 2010).

The son of Kaeokulani was Kaumuali‘i. Born around 1780, the young king went through a period where a Regent (an older relative) made the decisions, but Kaumuali‘i eventually came to rule on his own. The remainder of his days was spent trying to keep Kamehameha, who had consolidated the rule of the other islands, from bringing Kaua‘i in as well.

Kamehameha had difficulty solidifying his rule. Rebellions, plague, and appeasing subordinates all kept him from mounting more than two serious efforts at physical conquest of Kaua‘i. The first effort to fail occurred in 1796 when Kamehameha sailed with an invasion fleet for Kaua‘i. Hit by a heavy storm, the fleet turned back to O‘ahu (Kamakau 1961). The second
effort failed in 1804 when Kamehameha mustered his forces on O'ahu, but the army fell victim to *oku'u*, a smallpox epidemic. Kamehameha himself almost died, and far too many of his troops, counselors, and their families did succumb (Kamakau 1961). In 1810 Kamehameha used diplomacy, suggesting that he rule the eastern islands in name and deed, while Kaumuali'i acknowledge his suzerainty but continue to rule Kaua'i and Ni'ihau. It was agreed that the arrangement would end with the death of Kaumuali'i and that rule would then pass to the heirs of Kamehameha. It was an arrangement that Kamehameha and Kaumuali'i would honor, but that the heirs of Kamehameha would not (Joesting 1984).

This arrangement lasted between 1810 and 1822. It endured the death of Kamehameha the Great in 1819. During these 12 years, Kaumuali'i solidified rule of his kingdom and engaged in efforts to gain foreign weapons and support from the Russian Fur Company (Mills 2002). Also during this time, the trade in sandalwood flourished. Harvested in the Hawaiian Islands, traded for goods to European and American captains, and sold in the Chinese trade ports of Macao and Canton, sandalwood became the first Hawaiian cash crop (Ridley 2010). The Hawaiians called it *laau ala* (sweet wood) or *iliahi* (fiery surface) for its reddish blooms. They used this wood for scenting bark cloth, making dyes, and for medicinal purposes (Ridley 2010).

At first, the sandalwood revenue went solely to the paramount chiefs, Kamehameha and Kaumuali'i. However, with the death of Kamehameha, nearly all of his chiefs called upon the young heir, Liholiho, and the Regents, among whom was Ka'ahumanu, the favorite wife of Kamehameha but not mother of his heirs, to allow the chiefs to harvest sandalwood for their own profit. This practice would affect and disrupt the rule of Hawai'i and the welfare of the common people for decades.

The upland forests were scoured, crops were neglected, commoners suffered malnutrition and disease, chiefs went into debt to foreigners, and Liholiho was hard pressed to find new resources for his chiefs to exploit. Kaua'i appeared to be the answer. While continuing to honor the arrangement made by his father, Liholiho arrived on Kaua'i in 1822, visited with Kaumuali'i, and then kidnapped him, returning to O'ahu with his captive. In order to secure the rule of Kaua'i, Kaumuali'i was forced to marry not an heir of Kamehameha, but his wife, Ka'ahumanu. To ensure her hold, she also wed her new husband's son, Keali'iiahonui. This second marriage was later dissolved. However, ties between dynasties stayed strong as Keali'iiahonui married a granddaughter of Kamehameha, named Kekauōnohi (Mills 2002).

Ka'ahumanu had been instrumental in the overthrow of the *kapu* system of Hawaiian governance and social behavior, as well as one of the earliest and most prominent proponents of conversion to Christianity. That she utilized polyandry to achieve control of Kaua'i is just one
example of her abilities to utilize both traditional and introduced ways of life to achieve her goals (Joesting 1984).

While still titular ruler, Kaumualii'i did not exercise any power. Governors were appointed by the Regents, the first of these being the brother of Ka'ahumanu, named Kahekili Ke'eaumoku. Beginning with this Governor, land acquisitions beneficial not just to the Kamehameha line but to their powerful subordinates started.

The practice of allowing individual chiefs to harvest sandalwood was carried over to Kauai. How many Kauai chiefs retained their lands during this time is not certain. What was certain is that the mountains of Kauai, including Ha'upu, yielded the valuable resource. And practically the only place that it could be shipped was from the only secure anchorage at Waimea River. Waimea also served as a provisioning port of call to the growing number of whaling ships that began to appear in the Pacific.

The independent rule of Kauai came to an end in 1824 with the death of Kaumualii'i. This same year, the heir of Kamehameha, Liholiho Kamehameha II also died. The kingdom of Hawaii would now be ruled by a queen.

THE REGENCY OF KA'AHUMANU

Ka'ahumanu was one of Kamehameha's primary wives, his favorite in fact, but not of sufficient rank to be mother of his heirs. It appears she never bore the king, or anyone else, any children. From her actions following his death in 1819, it is apparent that Ka'ahumanu considered herself Kamehameha's heir. The mother of the heirs, Keopuolani, died in 1823. Her first son was Liholiho, born in 1796, made king in 1819, and died visiting London in 1824. Her second son was Kauikaouli Kamehameha III, born in 1813. Her daughter, Nahienaena was born in 1815 (Day 1984). With the death of Liholiho and his mother, Ka'ahumanu became Regent of the kingdom until Kauikaouli would come of age. Her rule of Hawaii in general, and Kauai specifically, was adroit, intelligent, and shrewd.

George Kaumuali'i and a number of Kauai chiefs forcefully resisted the rule of the Kamehameha line, and their revolt was crushed. As with many Byzantine events in Hawaiian history, some Kauai chiefs stood with the old, while others stood with the new. In this case, as with any other, people chose who they thought would benefit them most. Those who rebelled had their lands and lives taken, while those who did not, benefitted.

The first long term governor during the regency was Kaikioewa, a high chief born at Waimea, Kauai. He was a first cousin and brother-in-law of Kamehameha, a guardian of Kamehameha III, and a principal leader in crushing the 1824 rebellion (Mills 2002). He reigned
as governor from 1825 until his death in 1839. During his tenure, we know of at least one konohiki, or land manager, for Māhā'ulepū. Documents show that in 1826, Hukiku was konohiki. He was in attendance that year during a visit by the governor. Kaikioewa was accompanied by missionary Samuel Whitney of Waimea, who left an account of this event. It is unknown if Hukiku was Kaua'i born, or one of the conquerors invested with this stewardship. He may be the chief Kukiku, who Kaikioewa named commander of Paulaula o Hipo, also known as “The Russian Fort” (Mills 2002).

During his term as governor, Kaikioewa claimed Ha'upu Ridge, to the east/northeast of Māhā'ulepū, as his personal sandalwood reserve. One of the duties Hukiko performed may have been overseeing the efforts to harvest sandalwood from the ridge and transport it to foreign ships at Waimea or Kōloa. Eventually, as did so many other aliʻi, the governor would go into debt to foreign captains and merchants. When the sandalwood ran out, it is not clear how Kaikioewa paid his bills (Joesting 1984).

Kaʻahumanu ruled as Regent until her death in 1831. A daughter of Kamehameha, Kīnaʻu, took over as Regent until 1834, at which time Kauikeaouli Kamehameha III took the throne. He had lived on Kauaʻi as a boy under the protection of Kaikioewa but had spent the majority of his youth on Oʻahu. Ruling until his own early death in 1854, his reign was admirable for its civil rights, efficiency, and the creation of the Great Māhele, by which land awards to commoners and granting ownership to the disenfranchised was achieved. In Māhāʻulepū, there were many Land Commission Awards (LCA), discussed below, but the majority of the acreage was retained by the government. During his reign, there was an increase in the number of immigrants from Europe, the United States, and China. Missionaries, merchants, laborers, and farmers of multiple nationalities added to the diversity and complexity of the Kingdom.

LAND COMMISSION AWARDS

The Great Māhele was yet another drastic change in the lives of Hawaiians. Commoners, also known as makaʻainana, had for centuries been allowed use, but denied ownership of the lands they worked. This changed in the late 1840s when private ownership of lands was made into law. Certainly aliʻi, or nobles, had the better of the deal, but commoners were allowed to claim, through right of labor and longevity of occupancy, Land Commission Awards (LCA). King Kauikeaouli Kamehameha III was a sovereign brought up in the old ways who saw that some things must change, and orchestrated this new policy. A legal process was established, in which land claimants testified, and had others support their testimony, before a Commission appointed by the king. Traditional land use was communal and land use was often dendritic, following the course of streams and occupation zones from the coast to the mountains. Claimants
were often related and the lands they claimed were as varied in their usage as they were in their location. For a traditional ahupua'a to work, those mauka (towards the mountains) had to work with those makai (towards the ocean). The private ownership offered through the Māhele, however, created new risks for landowners. A commoner who did not own the land could not go into debt; but, one who did could achieve profit or debt. Land claim testimonials are complex documents. Boundaries are defined in a variety of ways. Land divisions descend in size from ahupua'a to kuleana to 'ili, thence apana, and finally mala, which are individual garden plots, fields, and/or lo'i (Pukui 1957). Other boundaries are defined by names of neighboring occupants or by use of the land. Testimonies were given regarding which chief had granted the occupant use of the land. This is compelling, because occupants claimed title based on grants from Kaumuali'i, last independent king of Kaua'i, to Kaikioewa, governor from 1824 to 1839 for the Kamehameha Dynasty, to his konohiki for Māhā'ulepū, Hukiki. They invoked the names of Ka'ahumanu, the Regent for nearly a decade, to Kīnaʻu, Regent and half-sister to King Kauïkeaulani Kamehameha III until he took the throne. Some claims were contested, others were not, and some were won on appeal. When one studies the LCAs of Māhā'ulepū, it can be seen that claims of land, in a variety of places, for a variety of uses, were made by individuals throughout the ahupua'a. With modern ownership, a traditional lifestyle could be maintained, but once individual plots began to be sold, and relationships were sundered, life for the commoners and nobles alike began to change drastically.

On Kaua'i, and in Māhā'ulepū Valley specifically, a number of land claims were made by residents who had been allowed use of the land during the reign of the previous king. In the valley, LCA 5080 to Kiko, LCA 4767 to Napaliala, and LCA 4769 to Nahuma, for example, were all claimants who had tenure from Kaumuali'i. It is presumed that their neighbors had similar histories (Ching 1974). That these residents all received their awards is notable because their claims were based on the right of use granted by the former ruler, and not by permission of the Kamehameha Dynasty. An 1896 map of the valley, depicts a “house” and “cattle pen” in the northern part of the valley and the LCA's just below, in what today is the mid-section of the valley (Figure 8). The 1896 map also shows the word “Path”, far above the LCA area. This “path” was fully investigated during the current survey and shown not to exist (see below). An 1897 survey map by Monsarrat (Figure 9) shows a better view of the LCAs.

Many of LCAs for Māhā'ulepū are tightly clustered within the 'ili of Kawailoa (Figure 10). There is a cluster east of Māhā'ulepū Ditch near the center of the valley. The remainder of the valley was deemed government land. Thus, no LCAs occur elsewhere in the project area or the extended survey area. It is interesting to note the estimated population of this portion of Māhā'ulepū Valley at this time. In 1848, 46 male names appear in genealogical records (M.
Ching, LDS Records). If one were to reasonably add one wife and at least one child per household, the population would have been 138 persons. In 1855, a total of 36 male names occur in the Māhāʻulepū records. Using the same figures, the total would have been 108 persons. This represents a fairly sizeable population for this upper valley at that time, all likely associated with the LCAs.

The following provides a representative sample of names and LCAs that are both present on the LCA map within the project area and are described in previous literature (Ching 1974). Claimants used owners of adjacent lands as boundary references and/or supporters of their claims. Many claimants were related in some way. The claimants of LCAs within the project area often also had additional claims downstream of Māhāʻulepū Ditch on the coast or elsewhere. Thus, only some of the claims discussed (kula lands, etc.) may actually be in the project area. A good example is LCA 5080, where a salt pan is discussed. Such claims related to salt pans would have occurred far outside the current project area near the coastline. In addition, some of the claims also include information about other LCAs claimed by the same person. While somewhat confusing, the summary of records are presented in full here in order to get a clearer picture of the LCAs in and around the surveyed area.
Figure 8. Registered Survey Map #1898 (1896) showing location of “House”, “Cattle Pen”, and LCAs in mid-valley. Note: “Path” in map center.
Figure 9. Registered Survey Map #1900 (1897) of LCAs in Māhā'ulepū Valley.
Figure 10. Modern TMK map of Māhā'ulepū Valley depicting LCAs.
LCA 4767 Napaliala received his lands in the days of Kaumuali‘i, who died in 1824. This was waste land when Napaliala took it over, occupied it, and developed it. He died in the late 1840s and his wife then possessed the land.

LCA 4769 Nahuma was another native who occupied lands prior to 1824. One piece was waste land when he took it over, built on it, and fenced it with stone. In addition he received on the death of relatives other lands occupied previous to 1824: two (2) lo‘i in the 'Ili of Kauki‘i, which had belonged to his wife through her parents; 7 dry taro patches in Kioea received through his father-in-law, kula land at Waipa which his brother had taken possession of, planted orange trees and cultivated; and two salt ponds. Nahuma appears to have been an affluent native.

LCA 4910 Kahee claimed property in the 'Ili of Kapakalehu; this property in the late 1840s had one orange tree. The konohiki contested the title of this property, claiming that Governess Kekaonohi had given it, and two more, to him and that he had cared for them, harvesting the fruit. Kahee never collected the oranges but contended that the governess had no right to give the trees to the konohiki as they had belonged to Kahee's parents, who had planted them and he was the rightful heir. That was the foundation of his claim.

LCA 5080 Kiko took over waste land, built his own fences and dug his own salt pond in the 'Ili of Kawailoa (Note: the salt pond would be outside the project area, near the coastline). The date of occupancy is not given but it probably was later than Kaumuali‘i, for Kiko's lo‘i came from Kīna'u's time. Kīna'u was a daughter of Kamehameha, mother of the kings Kamehameha IV and V, and was Regent between the death of Ka'ahumanu and the ascendancy of Kamehameha III, her half-brother.

Ching (1974) argues the recovery of waste land mentioned in LCA records was the clearing of previously untouched lands for cultivation. However, Putzi (2014) argues that these were previously cultivated areas left unattended due to a declining native population, but were brought back into production because of the incentive of individual ownership. It may be that ownership, as well as the threat of feral cattle and pigs, led to the construction of fences of either stone or wooden posts to delineate property boundaries. Other claimants shown on the LCA map were identified in the Mahele Database:

LCA 4770 Naahuao. The land came to Naahuao through his father, who was granted the land by Hukiku, the konohiki of Māhā'ulepū during the reign of Governor Kaikioewa. He gives his testimony as follows:

Greetings to the Land Commissioners: Be it known to you, the ones who quiet land titles, that I, Naahuao, a man living at Māhā'ulepū, island of Kauai‘i have a claim for land, and the kula. The genuine land is 56 fathoms long by 26 fathoms wide. The mala of noni is 26 fathoms long by 13 fathoms wide. The salt land is 6 fathoms long by 4 fathoms wide.
Another salt land is 10 fathoms long by 7 fathoms wide. A house lot is 28 fathoms on the long sides and 25 fathoms on the wide side. My message is ended. A respectful farewell to you, Naahuao.

**LCA 6667** Mika received lands from Ahukai (owner of LCA 4543) on the LCA map, but no further information has been gained. Mika received lands from Kaikioewa in the days of Kinau. His testimony reads:

The Land Commissioners, greetings: I, Mika, a Hawaiian subject living in Māhā'ulepū, hereby state my claim for 4 lo'i, 5 sweet potato enclosures, 4 mala of noni, and 3 orange trees. However, these claims are not situated together, but are in various cultivated places of Māhā'ulepū, also 1 mala of uhi/yam/ a kula planting of wauke and one other lo'i. 1 loko/ either fish pond or taro pond/ and 13 lo'i are bounded 80 fathoms on the east, 80 fathoms on the south, 20 fathoms on the west and 10 fathoms on the north. That is my claim which was received from Ahukai. There is also a kula named Hoopouliloa. Respectfully, Mika

The testimony of Mika says much about how Hawaiians utilized the Māhā'ulepū landscape and environs. Parcels were utilized for the cultivation of several food crops, for raising fish, and the growth of wauke for the production of kapa cloth. Except for the orange trees, this is a classic example of traditional Hawaiian life. The mention of sweet potato enclosures is interesting because 'uala were traditionally raised in long rows of intermittent mounds. It may be that these fields were fenced in to protect them from pigs or cattle, or that land ownership required definitive boundaries.

It is worthy to note that all the LCAs in the Māhā'ulepū project area are confined to a central area, on the east side of Māhā'ulepū Stream, with the remainder of the valley claimed as government lands. These LCAs form a tight cluster. Of additional interest is that during the height of the sandalwood trade the adjacent Ha'upu Ridge was claimed by Kaikioewa. It would appear that after his death in 1839 these mountain claims would revert to government control.

The Governor of Kaua'i in 1842 was Kekauonohi, the granddaughter of Kamehameha who had wed Keli’iahonui after having been a wife to her uncle Liholiho Kamehameha II. During her governorship, Kekauonohi partook in land exchanges, consolidating her grants in Māhā'ulepū and Kōloa. These consolidated lands would become the basis for the next cash crop – sugar, which, unlike sandalwood, could be rejuvenated and continued. From the 1830s until the 1980s, sugar would be the economic focus of Māhā'ulepū. Remnants of industrial-level sugar cane cultivation in the area represent the greatest number of historic properties documented during the current AIS.
The sugar cane history of Māhā’ulepū is intricately tied with the history of Kōloa. Sugar cane began to be grown and milled commercially in Māhā’ulepū Valley and around Kōloa in the 1820s, one of the first places in Hawai‘i where sugar was commercially grown (Donohugh 2001). Some of the earliest efforts were undertaken by Chinese immigrants (post 1820s-30s) who had a small mill in Māhā’ulepū, as well as in Kōloa and other parts of the island. The mills were small, producing raw sugar and molasses for local consumption. By 1835, however, many of these farmers were out of business and were later employed by new plantation owners.

In 1835, a sugar cane plantation owned by Ladd and Company was located to the west of the surveyed area. This was the first attempt at producing sugar cane at an industrial scale. The land was leased for a fifty year period from Kaua‘i Governor Kaikioewa and King Kamehameha III. Importantly, the lease was the first of its kind in Hawai‘i and represented the first formal recognition that someone other than a chief could control land use. Koloa Plantation, formally established in 1841, is universally known to be the first commercial sugar plantation in the islands. Ladd and Company was the first owner of the plantation but financial difficulties caused them to sell in 1845. Robert Wood and his brother-in-law bought the plantation and kept the plantation going until 1899 when the Koloa Agricultural Company, the McBryde family, bought the plantation. The Koloa Plantation merged with Grove Farm in 1948 and continued operations through 1996.

The sugar industry grew sporadically between 1845 and 1875. At this latter date, the Hawaiian government scored a coup of its own when a reciprocity treaty with the United States was negotiated. This allowed all unrefined Hawaiian sugar to be admitted into the United States duty free. The cultivation of sugar was going to become profitable (Alexander 1985:74).

Koloa Plantation commenced growing sugar cane in Māhā’ulepū Valley in 1878, having focused more on lands to the west near Kōloa. A total of 875 acres of the flat valley floor was made available. The land was level, sheltered, and had a good underground water supply. However, there was an initial problem with the ground water as some of the valley was saturated and other areas were dry. Accordingly, Koloa Plantation undertook efforts to build infrastructure that would drain waters from the saturated areas, and divert that water to irrigate drier fields (Alexander 1985). Sugar cane requires much water so in 1897, the Koloa Plantation also excavated several wells to irrigate the cane in Māhā’ulepū Valley (see Donohugh 2001).

By 1897, the main source of irrigation water for the valley came from the ground water. At the northwest end of the valley, six wells were drilled and the water was pumped approximately a quarter mile to the north into the recently constructed Māhā’ulepū Reservoir.
The area of the wells was known as “Māhā'ulepū 14”, probably because that was the number of wells eventually drilled and/or in service. The primary source of irrigation water for Māhā'ulepū appears to have been the six wells drilled in 1897. Four more were drilled later and all were located near the western side of the valley. These wells pumped water to Māhā'ulepū Reservoir, where it was stored and released, when needed, to various parts of the valley via the irrigation ditch.

Irrigation ditches at both the north and south ends of the Māhā'ulepū Reservoir served to transport water to the crops and to receive water from existing streams descending from Ha'upu Ridge (Alexander 1985:97-98). A pumping station was built and manned with full-time resident staff who lived with their families in a camp here. The larger north to south, excavated irrigation ditch that extends the length of the valley was excavated but does not appear on the 1935 Koloa Plantation map (Figure 12). Intensification of irrigation efforts, which added to the waters provided by Māhā'ulepū Ditch, began after this date.

The thick clay soils of the Valley were difficult to till using plows pulled by teams of oxen. However, with the introduction of steam powered tractors, more land began to be put into production. Development thus began to escalate at the start of the 20th Century. The number of laborers increased from 430 in December, 1900 to 769 in July, 1901. In February, 1904 it was reported that 600 out of 730 men were “working on permanent improvements.” (Ibid.) Infrastructure modifications in Māhā'ulepū Valley also intensified at the start of the 20th Century, with the excavation of canals, reservoirs, and wells. A narrow gauge railway was also constructed in the valley. The railway extended from Koloa Mill to “Māhā'ulepū 14”, the series of wells on the valley floor at the northwestern end of the valley itself. The railway tracks were movable, but SCS found no evidence of them in the valley during the current AIS. Other portable narrow gauge rail systems were utilized to facilitate the harvest.
Figure 11. Koloa Plantation infrastructure (1912 USGS Territory of Hawai’i Quadrangle portion).
In 1904, $16,420.81 was spent on additions to the plantation railroad system, including “a three-mile addition to the Puuhi railroad and a short cut road to Maha'ulepu” (Ibid.). Considering a laborer in the fields made about $17 per month, this was quite an expenditure at the time (Alexander 1985:122).

While the Plantation owned all the land, they contracted with groups of approximately a dozen men to manage parcels of fifty to one hundred acres. Koloa Plantation “…furnish[ed] land, seed-cane, water, fertilizer, and tools, and perform[ed] such portions of the work as require[d] expensive machinery, such as plowing, furrowing and hauling the cane to the mill” (Ibid. 97-98). The contractors, however, otherwise took care of their parcels from planting to harvest, selling the cane to the Plantation at a set price. This method kept the land under one owner, but provided the contractors incentive to raise a bountiful crop (Ibid. 123).

Early 20th century maps document the extent of the fields throughout the Kōloa and the Māhā'ulepū Valley areas. The fact that Māhā'ulepū Valley was used for extensive sugar cane cultivation is also evidenced by the infrastructure developed within the valley over time. Thus, the available information demonstrates that HDF’s project area consists of lands that were previously used for sugar cultivation.

Grove Farm continued to produce sugar cane in the greater Kōloa area, including Māhā'ulepū, until 1974, when it leased its Kōloa lands and mill to McBryde Sugar Company (Donohugh 2001). Sugar production continued under McBryde until September, 1996 when the mill officially closed.

The Wilcox Family sold Grove Farm to S. Case in 2000. From the early cultivation times until then, the lands extending from Māhā'ulepū Valley to the sea were extensively modified for the cultivation of sugar. Fields were plowed, streambeds cleared, irrigation ditches excavated, reservoirs created, roads built, and wells drilled.

During the remainder of the Kingdom, then the Republic, through the Territorial Period, and into Statehood, sugar cultivation and Māhā'ulepū would be synonymous. More recently, since sugar cane cultivation operations ceased, Māhā'ulepū Valley has been the location of cattle ranching (2002) and taro cultivation (2007), the latter being done through lease to W.T. Hara.
Figure 12. Distribution of Koloa Plantation lands (1935).
PREVIOUS ARCHAEOLOGY

There have been numerous archaeological studies along the coast of Māhā'ulepū, but archaeological studies within Māhā'ulepū Valley and nearby inland environs have been limited. Figure 13 shows the location of relevant studies both within the current project area and close to the project area. The reader is also referred to a National Park Service (NPS; 2008) regional study for a praxis of the projects conducted along the coastline. A sampling of other studies that are further removed from the Māhā'ulepū project area are also briefly described below to provide additional context on a regional scale. Studies performed in areas closer to the ocean include those conducted by Farley (1898), Thrum (1907), Bennett (1931), Kikuchi (1963, 1980, 1981, 1988-d), Ching et al. (1974), Neller (1981, Rosendahl (1988, 1989), Hammatt (1979, 1989a, b, 1990 a, b) Pietrusewsky (1990), Walker and Rosendahl (1991) and Firor and Rosendahl (1994). Four projects were conducted directly with the current project area: Thrum (1907), Kikuchi (1963), Ching et al. (1979), and NPS (2008). The studies described below are listed in chronological order, not by geographic location, and provide both a regional and local context to previous archaeological work in the Māhā'ulepū area.

The earliest study was by F.K. Farley in 1898. During this study, petroglyphs were discovered beneath sand dunes at Keoneloa Beach, to the southeast of the current project area near the Hyatt hotel. According to Farley, local residents knew of the petroglyphs and reported that they had been exposed previously.

The antiquarian T.G. Thrum documented two heiau on Kaua'i named Weliweli and Waiopili (Thrum 1907). The former was not accurately plotted on any map, while the latter was located along the stream of the same name that descends from Māhā'ulepū Valley. Waiopili Heiau was formerly just south of the current project area, near the present-day quarry.

Within the valley itself, but outside of the project area, Thrum identified the possible location of a large heiau named Hanakalauea. This heiau was reported to have been dismantled in the 1860s by a gentleman named Fredenberg and the stones then used to build cattle pens (Thrum 1907). Thrum also reports a fourth heiau, named Keolewa, on the crest of Mount Ha'upu (Thrum 1907; see also Bennett 1931, Site 90). It is not certain if Thrum or Bennett actually visited the site, but both noted that it was a small heiau dedicated to a goddess named Laka (Thrum 1907; Bennett 1931). A cursory field inspection of the summit by SCS archaeologists in December 2015 did not note any definitive structural remnants of this heiau.

During an archaeological survey conducted in 1928-1929, Bennett (1931) located or re-located the heiau at Weliweli and Waiopili. The Keoneloa Beach petroglyphs were not exposed
during this visit but he collected information about them from local residents. Bennett also recorded human burials within the sand dunes at Makahuene Point.

According to Bennett (1931:46), at Waiopili Heiau, “a tower of stone stands in one corner. It is solid enough to climb upon and an excellent view is afforded from the top. It is a unique feature for Kaua'i heiau, and if modern, defies conjecture as to the reason of its construction.” According to Ching (1974), “Waiopili Heiau is a rectangular walled enclosure, which lies on a smooth pahoehoe lava bed. The limestone cliff which forms a natural boundary between Māhā'ulepū and Pa'a lies almost directly to the south of this temple.” Chang (1974) further states that Kapuneka Pond is nearby and that the walls were large, 2.5 m wide and 2.0 m high, constructed of pahoehoe slabs. The heiau was still mostly visible in 1974. By 2006, only a very small portion of the southern wall of the heiau was visible, near a spring pump house. The heiau has been mostly destroyed by quarrying activities, as well as by the quarry road which runs along the southern boundary of the former structure.

Kikuchi (1963) conducted an archaeological investigation of coastal Kōloa. In addition to identifying new sites near the coast, he re-located several sites described by Farley, Thrum, and Bennett: Site 96 (Kane'aukai Heiau); Site 97 (dune burials); Site 98 (Keoneloa Beach Petroglyph Field); Site 99 (Weliweli Heiau); Site 100 (Keoneloa Beach Walls); Site 101 (Makaweki Point petroglyphs); and Site 102 (a structure).

Kikuchi also documented the only previously identified site within the surveyed area, Site -3094. This site is composed of a large boulder sitting in a pasture at the northern end of the valley. Kikuchi (1963) notes this boulder as occurring some 2 miles inland. Some twenty anthropomorphic figures, two pecked cups (4 inches deep), and a long groove are etched on the surface (Ching et al. 1974; McMahon 2007; see also Cox and Stasack 1970). The groove may represent a stream, but interpretation is uncertain. As discussed below, this site was fully recorded and mapped during the current project. In addition to the one boulder previously identified by Kikuchi (1963), two additional petroglyph rocks associated with this site were also documented during the current AIS (see Results section below). Thus, Site -3094 now consists of three features.
Figure 13. Previous archaeological studies in the Māhāʻulepū area.
During surface survey of 1,100 acres along the coastal lands of Weliweli, Paa, and Māhā'ulepū Ahupua'a, Ching et al. (1974) wrote of Weliweli Heiau: “no actual alignments or other features were noted at the reported location of this temple. This site has either been completely destroyed or is located elsewhere” (Ching et al. 1974:81). During the Ching study, the archaeologists found and sketched the petroglyphs at Keoneloa (Site 84), found sand dune burials (Sites 3096, 3097 and 3024) and re-located Waiopili Heiau (Site 87). They also located Waiopili Pond and Kapunakea Spring, but these were not given site designations (Firor and Rosendahl 1994).

Kikuchi (1984) continued archaeological investigations along the coastline of Keoneloa Beach. Kikuchi documented numerous sites and at least one, but possibly two, cultural layers that extended along the length of Keoneloa Bay (Kikuchi 1998a). This was the beginning of an era of extensive archaeological excavations and monitored construction excavations in this area. Work by Neller (1981), Rosendahl (1988, 1989), Hammatt (1979, 1989a, b, 1990 a, b) Pietrusewsky (1990), Walker and Rosendahl (1991) and Firor and Rosendahl (1994) followed.

McMahon (1996) conducted an archaeological field inspection of an area approximately 25,000 square feet in size on the southeast flank of Ha'upu ridge for the proposed installation of a radio tower. The project area for that study was located at 1,500 ft. asl. No sites were identified, nor were any trails observed along the ridgeline; the area was, as McMahon notes (1996), only accessible by helicopter.

Following this study by McMahon (1996), a letter was submitted by the Office of Hawaiian Affairs (OHA) in March 1998 to the Federal Communications Commission opposing the construction of a radio tower on Mount Ha'upu. The letter stated that the mountain is of special significance to Native Hawaiians as a wahi kapu (sacred place): “Ha'upu is our kin, descendent of Papa [Earth mother] and Wakea [Sky father], and older sibling of the Hawaiian people. This is the main reason why we, as Hawaiians, hold Ha'upu sacred in our hearts”. According to the OHA (1998) document, Ha'upu was named after a demi-god/warrior who took a large boulder from Kaua'i and threw it across the Ka'ie'ie Waho Channel, where it killed an enemy chief on O'ahu. The small heiau atop Mount Ha'upu is dedicated to the goddess of hula (Laka). Both the heiau and the wooded areas at Ha'upu Summit are known as keolewa, a word common in Hawaiian oral traditions. In addition, Ku and Hina, the first Hawaiian god and goddess, live on Ha'upu Ridge. Mount Ha'upu was also an important navigational landmark for traditional Native Hawaiian fishermen, and Hawaiians today still view the mountain with reverence (OHA 1998).
Beginning in the 1990s, Burney and Kikuchi began excavating the Makauwahi Cave and Sinkhole. They stated that within the cave “in a single stratigraphic sequence and encapsulated view of the full span of human occupation, including the millennia preceding human arrival, earliest human evidence, subsequent population increased and cultural change, European contact, and modern transformation” (Burney and Kikuchi 2006). Amongst the many discoveries from this study are bones of a Polynesian rat, which dated to 1039-1241 A.D. Because the rats were in the canoes with Polynesian voyagers, this is some of the earliest evidence for human occupation of this area. Excavations also exposed intact cultural layers, as well as culturally sterile deposits. Artifacts such as files, picks, scrapers, adzes, fish hooks, octopus lures, game stones, sling stones, and hammer stones were recovered. The preservative qualities of the deposits in the sinkhole were excellent. Fiber cordage, wooden fragments from canoes, paddles, and tool handles were also recovered. These materials came from three excavations. There is much potential for more information to be gained from this site (Burney and Kikuchi 2006).

Archaeological surveys and field work were conducted farther to the southwest along Waikomo Stream by Cultural Surveys, Hawai'i, Inc. (Hammatt, et. al. 2004). The terrain this stream flows through is different from the terrain that the stream which flow out of Māhā’ulepū Valley travels through. Features originating during the pre-Contact era include agricultural terraces, habitation terraces and platforms, and irrigation auwai along both crests and bases of long, low ridges were observed (Hammatt, et. al. 2004). This complex of sites is designated the Kōloa Field System.

The most recent comprehensive effort at documenting the biology, botany, geology, ecology, and archaeology of the region is that compiled by the National Park Service (NPS; 2008). “The Māhā’ulepū, Island of Kaua‘i Reconnaissance Survey” published in 2008 consists of an effort by the NPS to re-identify multiple natural and cultural features in the Māhā’ulepū Valley and environs. The goal was to argue for the importance of conducting a more thorough natural and cultural study of the area along the southeast coast of Kaua‘i from Kōloa to Poipū, and northward along Māhā’ulepū, Kipu Kai, Niumalu, and Nawilili Harbor. Included in the study is Mount Ha‘upu and the ridgelines extending from it (NPS 2008). The study presents a summary of the natural and cultural features for the area and effectively argues for additional research.

SETTLEMENT PATTERN AND SITE EXPECTATIONS

Prior to European contact, the rulers of the Hawaiian islands divided the landscape into political entities known as ahupua‘a. These landholdings varied in size but shared a few common traits. Their boundaries extended from the mountains to the sea shore, with fishing rights extending to pelagic waters. Where possible, the boundaries incorporated natural features such as
ridgelines and streams. Each ahupua'a was ruled by single ali'i, or noble, and the holdings were managed by konohiki, persons of slightly lesser status. The pre-Contact population was composed of farmers, fishermen, craftsmen, priests, rulers, and soldiers. Given the size and natural diversity of Māhā'ulepū Ahupua'a, there was probably a large population scattered throughout.

A PREDICTIVE MODEL OF TRADITIONAL SITE DISTRIBUTION.

Dega and Powell (2003) developed a landscape model of variation in physiographic and environmental zones in eastern Kaua'i as a way of predicting the general location of traditional sites and features, including buried sites. This model is being applied across Kaua'i. [Note, Hammatt et al. have used a slightly different variation of this zone model idea in numerous reports (e.g., Masterson et al. 1994)]. This section describes the zone model, as defined by Dega and Powell, and modifies it slightly to more explicitly include the potential impact of historic activities on traditional sites (e.g. road cuts, utility excavations, irrigation ditches and pipelines, sugar cane cultivation), but also the preservation and protection of surface and/or buried traditional sites. These historic impacts are discussed in relatively broad terms here. Specific archaeological and historic data directly relevant to the project area are presented in the following section.

Particularly for traditional Hawaiians in pre-Contact times, resources and opportunities to exploit them were distributed unevenly across the landscape, and the archaeological record should reflect this. The model divides landforms into five general zones, and Dega and Powell (2003) integrate broad patterns in the known distribution of archaeological finds within these zones. This allows for more specific – and scientifically testable – predictions than simply the probability of finding sites in a given location. The model predicts, for example, not only that the coast and near-coast were more intensely inhabited than the foothills and plateaus, but also that the types of sites created in these zones would be different. The zone model is therefore based on empirical data documenting variation in the physical as well as the cultural landscape of Kaua'i. As stated, historic impacts on traditional sites should be considered, and some fairly general observations can be used to predict at least some of these. Here, only general references and broad trends in the archaeological record of Kaua'i are relevant.

SITE TYPE PREDICTIONS AND FREQUENCY BY ZONE

The model divides the landscape into five broad zones: Coast (I), Back Beach (II), Marsh (III), Hills/Plateau (IV), and Mountains and Steep Slopes (V). According to the model, the first three zones (coast to marsh) have been more or less continually utilized, in some way, from very
early times into the present. Especially in traditional times, Zone II has been most important for habitation for two main reasons: (1) it straddles two highly productive and accessible eco-zones (i.e., marine-coastal and pond-estuary), meaning that its inhabitants could easily exploit both areas; and (2) in geomorphological terms, Zone II is a relatively stable landform not prone to flooding from either the sea (as with Zone I) or the uplands (as with Zone III). Note that the model does not take into account population pressure or chiefly edicts that might cause people to settle in marginal areas or cause people to pursue less than optimal adaptive strategies.

Māhā'ulepū Ahupua'a contains all five zones, with the survey area primarily occurring in Zone IV to the base of Zone V.

**Zone I (Coast)**

Zone I consists of beach sands and adjacent coastal dunes, which include frontal accretion deposits, backslopes, the crest, and the slip face. Zone I includes the area from the high-tide water mark of the ocean to the lower portion of the slip face near the interdune area, or, where the backside of the dune becomes flat and expansive. Zone I sediments are primarily composed of beach sands. These sands are subject to variable sorting when energy depositional events such as storm surges or tsunamis lead to the deposition of coarser sand grains while low energy events can lead to well-sorted, often fine-grained, sedimentary deposition. This is a dynamic zone in terms of landscaped morphology as it constantly evolves through wind and tides, particularly if vegetation or modern impediments do not curtail dune migration.

Archaeological work in Zone I commonly yields habitation sites and features, but there are rarely the remains of permanent settlements. The potential difficulties of living permanently in Zone I include dangerous flooding, high winds, and shifting sand. Landscape features can be quickly buried and/or exposed in Zone I, where more temporary sites, such as fishing camps were located. Archaeological evidence of activity area, such as tool and gear workshops and maintenance sites, are also common in Zone I, but these tend to be relatively ephemeral because they are usually the result of short duration visits. Traditional Native Hawaiian burials are another important site type in Zone I sediments. Burials in this zone would be located at or above the typical high tide mark, i.e. near the transition to Zone II, rather than towards the seashore itself. Note: With the recent increase in beach erosion, burials have been found in more frequency in these tidal zones.

Historic impacts in Zone I include the construction of sea walls, jetties, and retaining walls. Sea walls and retaining walls, in particular, have the effect of stabilizing and sometimes burying Zone I sediments, potentially locking in subsurface deposits. Much of the Māhā'ulepū coast has been modified in this manner, especially at Poipu and Kōloa.
Zone II (Back Beach)

Zone II occurs inland from Zone I, and represents a more stable land surface. This zone comprises the coastal plain or back beach environment. Like Zone I, Zone II primarily consists of calcareous sand beaches derived from the decomposition of coral and seashells. These deposits and associated coralline basements occur far inland in some areas, reflecting the Holocene high sea stand occurring between c. 5,500 years ago and lasting until about 2,000 years ago (Fletcher and Jones 1996). Zone II represents an area that almost never floods, except in the rarest of conditions (e.g., a 100 year event). Along the Māhā'ulepū coast there are windblown modern dunes, and a fossil-rich lithified dune system in Zone II (NPS 2008).

Archaeological work in Zone II commonly yields permanent habitation sites and burials from traditional Native Hawaiian occupation. In fact, all manner of sites, and features associated with settled, near-coastal communities were located in Zone II, and large population centers were common.

Because Zone II landforms are stable, accessible, near-coastal settings, usually over relatively level terrain, historic impacts have been severe. These impacts include road building, residential and commercial construction, excavation for utility trenches, and mining of the sand for construction purposes.

Zone III (Marsh)

Zone III consists of wet marshland, or slightly depressed pond areas, inland of Zones I and II. Zone III is amenable to soil catchment (i.e. sedimentary deposition), and is located at or very near seal level, yet retains more terrigenous characteristics. This marshland does contain some sandy sediment, but alluvial silty clays and clays from the uplands dominate soil matrices. Zone III would have a unique eco-zone for hunting marsh birds for food and feathers, and the collecting of their eggs.

In traditional times, Zone III provided a near-coastal alternative for agricultural production normally only afforded at locations farther inland. Archaeological work in Zone III commonly yields evidence of traditional walls, ditches and terraces of the lo'i (irrigated) field systems. Fishponds were sometimes located in this zone. Residents on either side of Zone III could utilize this area for agriculture, aquaculture, and wildlife harvest.

South of the project area, Māhā'ulepū Ditch, formerly a natural stream, joins with a natural spring and the remnants of Kapunakea Pond, and regains a more natural appearance. It continues to the coast, re-named Waiopili Stream (NPS 2008). It flows near Waiopili Heiau, and a unique site in Hawaiian archaeology, Makauwahi Cave. Makauwahi Cave is a limestone sinkhole with interior caves containing a complex stratigraphy with the different layers.
containing evidence of traditional Hawaiian occupation and the natural deposits accumulated prior to the arrival of the first voyagers.

**Zone IV (Hills and Plateau)**

Zone IV is characterized by hills, valleys, and grassy plateaus that lead into more mountainous terrain. Subsurface deposits are dominated by silty clays and clays derived from the decomposition of underlying basalt, as well as the deposition of alluvial and colluvial clays, particularly in valley areas. In many places, the soils are also rich in iron and other nutrients amenable to the cultivation of traditional food crops and, historically for the industrial production of Kaua‘i’s most lucrative commercial crop, sugar cane. Archaeological evidence has documented a number of site types in Zone IV:

1. Trails connecting lowland and upland sites and resource areas, varying in construction and size;
2. Agricultural plots, with terraces and retaining walls, for garden and/or medicinal plants, and terraces for dry land agriculture such as ‘uala (sweet potato) could be present within this zone;
3. Arboriculture would have flourished in this zone. Thus, evidence of the cultivation and maintenance of ulu (breadfruit) and other tree resources could be found here.
4. Permanent and temporary habitation sites; and
5. Heiau.

The project area for this AIS is located in Māhā‘ulepū Valley, on relatively level ground previously utilized for sugar cane cultivation. The intensive transformation of the landscape through clearing, plowing, and harvesting has resulted in the removal and/or destruction of archaeological sites and related features. However, at the base of slope in the extended survey area (outside the project area) there is what appears to be an agricultural heiau. This site is within Zone IV but near the transition to Zone V.

**Zone V (Mountains and Steep Slopes)**

Zone V consists of the steep slopes of mountains and those of major drainages such as gullies and ravines. Lands classified as Zone V are typically rugged, remote areas of the terrain where human occupation and utilization are temporary and/or episodic. Soils and sediments in Zone V drive from the decomposition of the underlying bedrock. Because of the prevalence of steeps slopes in this zone, soils and sediments are relatively thin and subject to downslope movement. Cultural features such as retaining walls, terraces and trails are usually found in association with rock outcrops and caves. Erosion is the greatest threat to whatever cultural deposits might be found on these slopes. During informal survey of this zone by the SCS crew, several sets of agricultural terraces were located on the eastern slopes of the valley, far outside
the project area and extended survey area, the terrace sets were in poor condition due to natural erosion and located adjacent to several small drainages.

Traditionally, Hawaiians did construct *heiau* at elevations, but in some instances a natural place could be considered sacred without an actual structure (*i.e.*, Ha'upu Ridge). Stone was quarried traditionally for tools of high grade basalt and the forests were harvested for building materials. Increasingly through the first four decades of the 19th Century, sandalwood was collected until near extinction, which increased the risk of erosion in the mountains. Later in the 19th Century and into the 20th Century, irrigation infrastructure for the sugar cane industry was carved into the mountains and slopes as well.

**SITE DISTRIBUTION AND CHRONOLOGY**

Site distribution across these five zones is often determined by historic land use, when landowners and others utilized the same lands as were previously cultivated and occupied during pre-Contact times. Sometimes these earlier signatures are erased, depending upon the intensity of historic land alterations; sometimes, however, they are not, as evidenced by the many inland, pre-Contact sites occurring across southern Kaua‘i. Pre-Contact sites are identified in coastal or near coastal areas, locations removed from intensive sugar cane production, but also in large valleys and uplands that were not disturbed through time. *Heiau*, as seen via this report, and fishponds, among other pre-Contact site classes, are also preserved inland. This pattern occurs beyond the south shore as well, where pre-Contact sites are preserved inland, such as in Waimea Canyon and Makaweli, for example. Typically, however, the earliest dates for initial settlement of an area, for this part of Kaua‘i, occur at the coastline.

Dates from the coastline fall in the A.D. 1000-1200 range for this part of Kaua‘i, with expansion inland proposed to have been during the A.D. 1400-1600s, as was a pattern across the islands (see Kirch 1985). Agricultural field systems were created within inland areas, closer to fresh water resources and soil more amenable to *kalo* and sweet potato production. Permanent habitation locales were present from the coast to more inland areas, with ceremonial sites, walls, and other associated structures being built near the coast and far upland. Within the mountainous areas, such as at the back of Māhā‘ulepū Valley, temporary habitation loci would have been utilized by those gathering upland resources. The middle zone, such as Māhā‘ulepū Valley, was ideal for agriculture and homesteads, as witnessed by the numerous LCA’s occurring in a small section of the valley. However, it appears that historic land use would have erased many of the archaeological signatures for such settlements/land use. This is evidenced by the presence of a ceremonial site (Site -3094; see below) in the extended survey area. What is more apparent now
in the archaeological record of Māhā'ulepū is infrastructure associated with that intensive sugar cane production from the plantation period.

**METHODOLOGY**

Several phases of fieldwork were undertaken as part of this AIS. Prior to fieldwork, a review of the archival record and previous archaeological work in the surveyed area and environs was completed. This archival work was integral in determining the types and nature of sites that could be encountered, as well as to aid in determining trenching locations. A search of Kaua'i Historical Society photograph collections by M. Ching did not yield any photos significant for the surveyed area or this study.

**FIELD METHODS**

Fieldwork was conducted between July 7 through 25, 2014 and August 20 through 26, 2014 by Jeff Putzi, B.A., James Powell, B.A., Milton Ching, B.A., and Michael Dega, Ph.D (Principal Investigator). Fieldwork consisted of a systematic 100% pedestrian survey of the entire project area and extended survey area, representative mechanical trenching on the valley floor, and manual excavation units placed at one site, the enclosure (Site -2250). For purposes of the pedestrian survey, the crew was spaced a variable 5 m-10 m, depending upon ground visibility. Visibility was very good across the valley floor and good around the perimeter of the floor. When sites were identified, they were mapped to scale using tape and compass (except for the longer ditches), digitally photographed, and GPS recorded. The longer ditches were recorded using GPS (both terminal ends) and appear on most maps/aerial photographs for the area. Sites were recorded in detail to reflect their overall integrity, size, and location in the surveyed area.

As noted above, given the historic land use in the project area and associated likelihood of the destruction of historic properties through that land use, the SHPD-Kaua'i requested that the scope of the AIS be extended beyond the project area to include the extended surveyed area at the back of the valley to the north, east, and west flanks. Because the extended survey area is outside of the footprint of historic sugar cultivation, surveying this area could provide information and context no longer available in the project area. The land in the extended survey area is owned by Mahaulepu Farm LLC but not within the property leased to HDF for the project. Thus, HDF and SCS needed to obtain permission from the landowner to enter and survey the extended survey area, which ultimately increased the surveyed area by some 1,300 square meters beyond the original survey area.

In addition, a total of seventeen stratigraphic trenches were mechanically excavated by backhoe across portions of the valley floor. Trenches were mostly focused on the cluster of
LCAs in the central/eastern portion of the project area and, through the area of the proposed effluent ponds, where excavation for the project is proposed. All trenches were examined, profiled, and photographed. Manual testing of nine units was completed at Site -2250, the enclosure in the extended survey area. This additional testing was also approved by the SHPD-Kaua‘i to further understand the function of the site. The number of units was increased to a total of nine units as no cultural materials were identified in the first several test units. All sediment from the units was screened through 1/4” and 1/8” wire mesh screens, to recover any smaller cultural material fractions. All units were plotted on a site planview map, profiled, and back-filled. No units were left open at the end of each day.

In addition, an SCS crew field visit was completed on June 19, 2015 to the location where the word “Path” was marked on Registered Survey Map #1898. The additional survey was recommended to assess the presence/absence of a “path” or trail in the area. As discussed further below, this field visit re-confirmed that there is no evidence of a path/trail present in the noted map location or in the vicinity. The “path” survey point marked the location of a ditch on the eastern flank of the valley.

LABORATORY METHODS

As only one artifact was recovered during surface survey, trenching, and testing, laboratory methods were primarily limited to drafting field site plan view maps, stratigraphic trench profiles, profiles of the test units, cataloguing all photographs and maps acquired during the AIS, and reporting. The single artifact, from a test unit outside Site -2250, the enclosure in the extended survey area, was analyzed and catalogued. This artifact was returned to the site during a February 3, 2015 field visit with the SHPD and others. All field notes, maps, and photographs pertaining to the AIS are currently being curated at the SCS main laboratory in Honolulu.

CONSULTATION

Preliminary consultation, as described further below, was undertaken in connection with the current AIS by the archaeological field crew. A more formal consultation, via a Cultural Impact Assessment, has also been undertaken to provide much more in-depth information and through personal interviews related to the project area. For the AIS, the following individuals and groups were consulted:

State Historic Preservation Division-Kaua‘i Lead Archaeologist

The Lead Archaeologist for Kaua‘i was consulted prior to the commencement of fieldwork, during fieldwork, and post-fieldwork. Following one of two field visits to the project area, the
Lead Kaua‘i archaeologist recommended that survey be conducted not only of the immediate project area in the valley, but also up to the ridgeline. The presence of Keolewa Heiau, on Ha'upu Ridge, and a former heiau, Hanakalaua Heiau, within the valley, suggest the possibility that pre-Contact/historic era trails may have at one time connected the project area to the upper ridgeline. However, as discussed below, SCS did not observe any evidence of trails.

The presence of the enclosure, interpreted to be an agricultural heiau in the extended survey area (Site -2250, see below) and small terracing, the latter occurring well beyond the extended survey area, also suggested that additional pre-Contact sites could possibly be present further upslope from the project area proper. However, the fact that additional sites may be located upslope does not mean the proposed project will have any impacts on such properties. As discussed above, given the scope of the project and the manner in which it will be managed and contained, impacts outside of the leased property are not anticipated; thus, the project area for purposes of this AIS is the area leased by HDF. Nonetheless, in an abundance of caution, and to maximize the possibility of finding information relevant to the project area, HDF agreed to include the extended 100 m survey area within this study.

Kaua‘i Historical Society

Research was undertaken here prior to fieldwork, during fieldwork, and following the completion of fieldwork. M. Ching and J. Powell, part of the field crew, researched old photographs and maps of the Māhā‘ulepū area (none were found), as well as text references (i.e., Bennett 1931) to further understand the sites they had documented during prior fieldwork.

Individuals

SCS (M. Ching) conducted interviews with several local residents who lived and worked for decades in the Kōloa-Māhā‘ulepū area. M. Ching talked primarily with 84-year-old Nelson Abreu and his nephew Russell Abreu. Discussions centered on land use through time and their knowledge of any historic or cultural properties in the Māhā‘ulepū area. Their insights regarding Plantation Era land use in the area, as well as the families who lived there, were invaluable.

SCS also interviewed James Case, now 95 years of age, who was born on Grove Farm and grew up in the Kōloa area. His thoughts on trails in the area and in general, life from the 1920s onwards, are presented below in short form. Mr. Case offered a tremendous historical recollection of these times, from Kōloa through Māhā‘ulepū and beyond to Nawiliwili and Līhu‘e, among other locations.

SCS is currently conducting a Cultural Impact Assessment (CIA) for the project, with many of the individuals noted herein getting additional time to discuss their knowledge of the area with SCS. This CIA will be completed in the near future.
February 3, 2015 Field Visit

On February 3, 2015, SCS, a representative from the SHPD-Kaua'i archaeology branch, land representatives, and community members met at the project area to conduct a field trip of the sites documented during this study and to obtain any insight these individuals may have on said sites. The secondary purpose was to get more overall feedback on the AIS, should they have any questions or comments. The following individuals from the community were present on the fieldtrip: Terrie Hayes and Billy Kaohelaulii, Mary Jane Naone (SHPD), Teddy Blake, , Kalani Kumai, Bridget Hammerquist, Rupert Rowe, and Jim Garmatz (manager for HDF). SCS was represented by J. Powell and M. Dega. During the visit, the group first stopped at the petroglyph rocks and second, at the heiau (Site -2250) in the extended survey area. In both locations, Kalani Kumai (aka Branch Harmony) conducted ceremonies to consecrate the sites. He also spiritually “closed” the heiau. The one artifact recovered during the AIS project, a lithic chopping tool (see below), was placed back in its original location, as witnessed by the group. Overall, the group visit was well received and the ceremonies accomplished goals set by many for being there. Both the petroglyph rocks and heiau were discussed in terms of the AIS, with these interpretations noted below.

Office of Hawaiian Affairs (OHA)

A copy of the original Archaeological Inventory Survey report was submitted to OHA on May 16, 2015 for comments. As of this writing, SCS has not received any formal comments from OHA. We will submit this revised report to OHA concurrent with submittal to the SHPD.
A total of sixteen (16) sites were identified during the AIS (Figure 14 and Figure 15). These sites were all identified through pedestrian survey of the project area and extended survey area. Fifteen (15) of the sites were newly identified during the current survey and one (1) site, State Site 50-30-10-3094, was previously identified and re-located. Of the sixteen identified sites, six (6) sites occur in the project area and ten (10) sites occur in the extended survey area (Table 1). Only one of these newly identified sites is believed to be associated with pre-Contact and/or early historic times, the Site -2250 enclosure. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and affiliated with sugar cane cultivation. That a majority of the documented sites are related to the historic-era is not surprising, given the extensive landscape modifications that occurred during intensive sugar cane cultivation on the valley floor. Even historic era cultural materials associated with the many LCAs in the project area were non-existent, as explored through survey and subsurface exploration.

In addition to survey, a total of seventeen (17) trenches were mechanically excavated in various portions of the project area, with no cultural findings. Trenching was concentrated in areas where excavation will be required for the proposed project and second, in the area where many LCAs are clustered in the valley. In addition to this trenching, multiple manual test units were placed in Site -2250, the pre-Contact enclosure, which aided in refining functional interpretations.

Note that Sites -2251, -2252, -2253, and -2259 all appear to conform to the same ditch (Figure 15), with the Site -2258 reservoir also being present near the ditch line. The ditch, as constructed following the creation of the reservoir, may have followed the course of historic or pre-Contact auwai, but no evidence of such water ways along or perpendicular to the ditch were found during the survey. Sluice gates emptying into the valley were found, but there were no associated ditches, suggesting the gates may have been placed there to deal with overflow or flooding, and not necessarily for the irrigation of a specific field. The flume with trestle bridge over the irrigation ditch appears to have been constructed after the ditch/reservoir system was built. The flume and trestle appears to have been constructed to continue the flow of water from streambeds off the ridgeline, into the natural water courses in the valley itself.

The following presents the sites in numerical order, as site numbers were presented to and provided by the SHPD. Please note Table 1 above which depicts the sites occurring inside the project area (N=6) and those occurring outside the project area (N=10).
### Table 1. Site Location and Descriptive Data.

<table>
<thead>
<tr>
<th>SIHP No. 50-30-10-</th>
<th>Site Type</th>
<th>Function</th>
<th># Features</th>
<th>Age</th>
<th>Site Location</th>
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<td>Outside Project Area</td>
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<td>Soil Retention</td>
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</tr>
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</tr>
<tr>
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</tr>
<tr>
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<td>Soil Retention</td>
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<td>Historic</td>
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</tr>
<tr>
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<td>Water Storage</td>
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<td>Ceremonial</td>
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<td>Pre-Contact</td>
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</tr>
</tbody>
</table>
Figure 14. USGS map showing location of identified historic properties in the surveyed area.
Figure 15. Aerial photograph showing location of ditch, Site -2251, -2252, -2253, and -2259.
STATE SITE NO. 50-30-10-2250 (TS-1)

Site -2250 consists of a rock enclosure occurring at the back of the valley within the extended survey area (Figure 16). The site lies c. 30 m off the valley floor. The enclosure is rectangular and measures 20 meters north-south by 9 meters east-west (180 m sq.; Figure 17 through Figure 20). The corners of the enclosure all occur at cardinal directions. The northeast wall is constructed of an alignment of small basalt boulders, at least 0.5 m in diameter, all of them fairly uniform in size. Two taller, but not wider, boulders are upright in this alignment. There is an opening at the west side of the northern end, which appears to form a formal entrance/exit for the enclosure.

The southeast wall of the site is constructed of basalt cobbles and boulders stacked and piled two to three courses wide and two courses high (0.30 m above surface, average). The cobbles and boulders range in size from 0.2 m in diameter to 1.0 m in diameter. Some portions of this wall appear to have collapsed but on the whole, the enclosure wall is in good condition. At the south end of the site are two upright boulders approximately 0.60 m in diameter and up to 1.4 m high. These are adjacent to a very large boulder that forms the south corner of the enclosure.

One large boulder at the southern corner is pyramidal in shape. It measures 4.0 m by 3.0 m by 1.4 m tall. Test Unit 4 was placed against this boulder (see below) as it would have acted as a “catchment” for any eroding cultural materials from the slightly uphill, northern end of the site. Extending westward are several other large boulders. Overall, a few small boulders are piled but the majority of the enclosure wall along the southern flank is formed by these roughly aligned boulders.

The long western wall is constructed in much the same manner as the long east wall. However, the former extends northwest before turning northeast to the presumed entry/exit to the enclosure. An upright boulder is present south of the corner, with two more upright boulders occurring to the north of the corner.

The area within the enclosure is mostly level but with a slight southward descent. The ground to the north is slightly higher in elevation. The site area is lightly forested with java plum, eucalyptus, and haole koa, but there is a dense grove of hau 25.0 meters to the southeast of the enclosure. There are no interior features within the site.
Figure 16. Location of Site -2250 (outside project area).
Figure 17. Plan view of Site -2250.
Figure 18. Site -2250. View to south.
Figure 19. Site -2250. View to west.
Figure 20. Site -2250. Note uprights in construction. View to west.
No cultural materials of any era were identified within the enclosure, its walls, or outside the enclosure. Given the size and shape of the site, its proximity to Māhā'ulepū Stream, its placement at the head of the valley, and the southern commanding view over the valley itself, the site was initially interpreted as either a large hale or an agricultural heiau. The site did not appear to be a traditional residence as these were most often multi-structural affairs spread over the landscape. None were found nearby. The site was also defined with each wall built in a different, distinct manner, with many upright boulders being incorporated into wall construction. Testing was needed to confirm or modify initial interpretations of the site.

**Testing**

A total of eight test units (TU) were excavated within the Site -2250 enclosure, with a ninth unit excavated 20 m to the northwest. Testing was completed in two phases, with 4 units being completed at the start of the survey and 5 units toward the end of the study. SCS consulted with the SHPD on all the excavation work, discussing the lack of cultural data recovered from the first few units, and agreeing to add several more units to Site -2250 in an effort to obtain more information about the feature, as its function was still in question.

Shovel Test Units 1 and 2 were excavated during the initial field work in July, 2014 with the remainder excavated during the additional efforts in August, 2014. The large number of test units was necessary given initial site interpretations (significant site) and second, the lack of findings in the first few test units. Testing aided in refining the site function determination.

TU-1 measured 0.5 m by 0.5 m and was excavated to a depth of 0.38 m below ground surface (Figure 21). The unit was placed along the interior of the west wall, south of the corner where the wall turns from the northwest to the northeast. This corner is defined by two upright boulders north of the corner and one upright boulder south of the corner. The unit was placed along the base of the upright boulder south of the corner. Two strata were present in TU-1: Layer I (0-0.30 mbs) was composed of dark brown (10YR3/4) silty clay. Layer II (0.30-0.38 mbs) consisted of a layer of gravel and cobbles, with silty clay between them. Excavation ceased after exposing the surface of a deposit of small sub-angular basalt cobbles and gravels. The goal was to keep it intact to assess the presence/absence of other possible pavements at the same depth in the enclosure. Layer II represented a paving and/or a foundation for the upright and the west wall. No cultural materials were observed in the unit.

TU-2 measured 0.5 m by 0.5 m and was excavated to a depth of 0.3 m below the ground surface (Figure 22). This unit was placed midway along the length of the interior, north wall. The north wall is an alignment of small boulders with one cobble extending south into the interior of the enclosure. The TU was placed with the boulders of the wall to the north and the cobble to the
east. Excavation extended to a depth below the boulders to determine the presence of any cultural materials, particularly charcoal to date site construction. One stratum was present in TU-2: Layer I (0-0.3 mbs) was composed of dark brown (10YR3/4) silty clay. Roots and rootlets were common from surface to the base of excavation. No cultural materials were observed. The unit was sterile.

TU-3 measured 0.7 m by 0.7 m and was excavated to a depth of 0.2 m below the ground surface. This unit was placed at the approximate center of the enclosure. One stratum was present in TU-3: Layer I (0-0.2 mbs) was composed of dark brown (10YR 3/4) silty clay. No evidence of paving or cultural materials were identified in the unit.

TU-4 measured 1.0 m by 1.0 m and was excavated to a depth of 0.34 m below the ground surface. This unit was placed along the interior base of the large, pyramidal-shaped rock that forms the south corner of the enclosure (Figure 23). It was theorized that placement of the unit here would act as a “backstop” and could have been a location where midden/artifacts could have been culturally or naturally deposited. Large in situ boulders rendered the unit smaller so that by the base of excavation there was little soil to excavate. One stratum was present in TU-4: Layer I (0-0.32 mbs) was composed of dark brown (10YR 3/4) silty clay. Roots and rootlets were common from surface to the base of excavation. Clastics were not common but increased in frequency with depth. They represent natural deposits and were not representative of a paving or cultural formation. No cultural materials were observed in the unit.

TU-5 measured 0.7 m by 0.7 m and was excavated to a depth of 0.59 m below the ground surface (Figure 24 and Figure 25). This unit was placed along the interior of the north wall, approximately 0.7 m to the west of TU-2. Three strata were present in the unit. Layer I (0-0.07 m) consisted of dark reddish brown (2.5YR 3/3) silty clay. Layer II (0.07-0.29 m) was composed of reddish grey (5YR 5/2) silty clay with many cobbles and gravels. This layer was interpreted as a possible paving and/or a foundation for the north wall. Continuing below the cobbles and gravels was natural sediment, Layer III (0.29-0.59 m) composed of reddish brown (5YR 5/4) silty clay. Unlike the nearby TU-2, no roots were present. No cultural materials were observed in the unit.
Figure 21. Site 2250, TU-1 profile. West face.
Figure 22. Site -2250, TU-2 profile. North face. TU-6 measured 0.7 m by 0.7 m and was excavated to a depth of 0.2 m below the ground surface. This unit was placed adjacent to TU-3 at the center of the enclosure. The surface of the boulder found in TU-3 was entirely exposed. The rock's diameter measured 0.7 m and was interpreted as an isolated, natural stone. One stratum was present in TU-6: Layer I (0-0.2 mbs) was composed of dark brown (10YR 3/4) silty clay. No evidence of paving cobbles and no cultural materials were observed in the unit.

TU-7 measured 0.5 m by 0.6 m and was excavated to a depth of 0.2 m below the ground surface. This unit was placed within the interior of the enclosure approximately 5.0 m south of the passageway at the northern corner. TU-7 was placed 6.0 m north of TU-3 and 3.0 m south of TU-5. One stratum was present in TU-7: Layer I (0-0.2 mbs) was composed of dark brown (10YR 3/4) silty clay. Roots and rootlets were common from surface to the base of excavation. No evidence of paving cobbles and no cultural materials were observed. The unit was sterile.

TU-8 measured 0.4 m by 0.4 m and was excavated to a depth of 0.3 m below the ground surface. This unit was placed to the north of TU-7. Excavation exposed the surface of a deposit of small, sub-angular basalt cobbles and gravels. These were originally thought to represent a paving such as was exposed in TU-2 and TU-5. However, TU-8 is not adjacent to any wall and the stones appear to represent a natural deposition. One stratum was present in TU-8: Layer I (0-0.3 mbs) was a dark brown (10YR 3/4) silty clay. No roots were present here, as compared to the nearby TU-7. No cultural materials were observed in the unit.

TU-9 measured 0.70 m by 0.70 m and was excavated to a depth of 0.20 m below the ground surface and ceased on bedrock. This unit was placed 20 m to the northwest of the enclosure and contained only one layer, dark brown (10YR 3/4) silty clay (see TU-7 for a representative profile, they are identical to TU-9). The unit was excavated amidst a scattering of large and small boulders to assess if they were natural or an extension of the -2250 enclosure. At 0.17 m below ground surface, a small cobble-sized basalt chopper was recovered (Figure 26). The basalt tool has a fractured end, which may have been a deliberately formed edge. There are no signs of pecking or flaking, and no signs of wear, but it may have been a tool formed specifically for one task and then discarded. No other cultural materials were observed in the unit. The scattered boulder area was determined not to be an extension of the enclosure itself, even though one artifact was present. The rocks were misaligned and did not connect to the enclosure. These rocks were also not a separate site; only the presence of the isolated artifact shows cultural use of the area.
Figure 23. TU-4 location. View to south.
Figure 24. Site -2250, TU-5 profile. West face.
Figure 25. TU-5 at base of excavation. View to west.
Figure 26. Chopper tool from TU-9. Note: this artifact was taken back to the site in February, 2015 and placed in the same location where it was discovered.
Results of Testing

A total of eight test units were excavated within the Site -2250 enclosure, with a ninth unit excavated 20 m to the northwest. No cultural materials were observed in any test units within the enclosure; the only discovery was a single chopping tool found in TU-9, outside the site. TU-1, placed against the interior of the west wall, at the base of an upright basalt boulder, and TU-5, placed against the interior of the north wall, both exposed a deposit of sub-angular basalt cobbles and gravels that is interpreted as a paving, a foundation for their respective walls, or a combination of both. TU-8, placed approximately 5.0 m south of the entrance at the north corner of the enclosure, also exposed a similar deposit. TU-2 was placed along the interior of the north wall, but did not expose this cobble and gravel deposit. TU-4, TU-7, and TU-9 did not expose the cobble and gravel deposit. TU-3 and TU-6 together exposed the flat surface of a boulder, but it was determined to be a natural occurrence. Excavation of TU-4 was halted due to tightly packed naturally-deposited boulders.

The deposit of sub-angular basalt cobbles and gravels exposed along the walls in TU-1 and TU-5 appear to be a paving and/or a foundation for the walls. A similar deposit exposed in TU-8 appears to be a paving. TU-8 was placed 5.0 m south of the entry/exit, at the northern corner and 3.0 m south of TU-5 along the interior of the north wall.

TU-9, excavated 20 m from the enclosure proper along what initially appears to be a connected alignment, yielded the only associated artifact, a small, smooth, oblong basalt cobble that could have been utilized as a chopper. The artifact was composed of fine-grained basalt and measured 16 cm long by 15 cm wide. It was fractured on one end and rounded on the other end, with smooth flanks. The artifact was found in TU-9, directly below a large boulder. The extended alignment was later interpreted to be a natural feature; the alignment was not proven to link with the enclosure in any way after the area was cleared. The artifact is considered to be an isolated find and was repatriated to its place of origin during a community fieldtrip in February, 2015. There is no exacting relationship between the single stone tool and the Site -2250 main structure. Again, it appears to be an isolated find, given that nothing was found in the enclosure after 8 test units were completed.

The site is interpreted to be an agricultural heiau. The enclosure is large (180 m sq.), with single-course, well-constructed walls that are in excellent condition. In planview, the enclosure is rectilinear and the four corners are at the cardinal directions. There is a formal passageway at the north corner of the structure. One very large boulder forms the corner of the east and south walls, and several large boulders form the south wall, which faces into Māhāʻulepū Valley. There are no surface features within the enclosure but there are several large boulders. The ground within the enclosure is flat with a slightly descending slope to the south. Trees are scattered throughout the
site area, including a grove of hau trees to the southwest. The interior of heiau were often paved, but the extent of the paving varied. The absence of cultural materials in all of the test units suggests that this structure was not associated with the everyday tasks attributed to a kau hale or habitation complex. The uprights appear to distinguish this site even more.

**STATE SITE NO. 50-30-10-2251 (TS-2)**

Site -2251 is composed of two plantation-era features, both in fair condition. This site occurs in the extended survey area. Feature 1 is a sugar cane irrigation ditch approximately 2.0 m wide and ranging from 0.5 m to 1.5 m deep (Figure 27). The feature is approximately 800 meters long and extends along, and just above, the base of the northern survey area slope. The feature alternates between being covered by high grasses and also passing through and along the edge of the tree line. The ditch passes south and west of -2250 (enclosure) and terminates at the streambed which forms the eastern side of -2252 (ditch, sluice gates). On plantation maps, the feature extends northward from P-154 to P-163.

Feature 2 consists of a plantation-era sluice gate directly affiliated with Feature 1 (Figure 28). This feature occurs in the extended survey area and is located 25 m southeast of the -2250 enclosure and is built on the southern side of the main ditch. The gate is composed of an upright, concrete slab 1.5 m long by 0.06 m thick. The exterior face is 0.75 m high but the interior is 0.20 m high, the latter portion obscured by the main ditch filling with eroded and water-born soils and detritus. The concrete slab has an interior slot on its top that contains an iron door for the gate. Basalt cobbles are aligned along the interior of the ditch on either side of the concrete. Approximately 1.0 m east of the gate, on both sides of the ditch, are two retaining components built of metal posts and sheet metal. These components worked in conjunction with the main gate. Neither the ditch nor the sluice gate have been maintained for some time.
Figure 27. Site -2251, Feature 1 ditch and Feature 2 sluice gate. View to southeast.
Figure 28. Plan view of Site -2251, Feature 2 sluice gate.
STATE SITE NO. 50-30-10-2252 (TS-3)

Site -2252 is composed of three historic irrigation features, all directly related to sugar cane production. The site occurs in the extended survey area. Feature 1 consists of an irrigation ditch measuring approximately 2.0 m wide and is a variable 1.0 m to 1.5 m deep (Figure 30). This ditch connects to, and is perpendicular with, two southward descending streambeds, which are approximately 100 m apart. Within the valley, these two streams join and form the Main East Ditch. Feature 1 is the same ditch as -2251, Feature 1 to the east and Site -2253, to the west. These features received different site numbers as they are non-contiguous in places. The ditch is identifiable but partially collapsed and filled with soil and detritus.

Feature 2 consists of a Plantation era sluice gate, similar to that described above at Site -2251, and having been identified in the southern face of Feature 1 and 30 m east of the western stream (Figure 29). This feature occurs outside the project area. The feature is 70 m west of Feature 3. This feature is in good condition.

Feature 3 consists of another sluice gate, occurring outside the project area, and present in the south face of Feature 1 and 10 m west of the east stream (Figure 31). The feature is 70 m east of Feature 2. This feature is in poor condition: the metal door is missing and the concrete is weathered.
Figure 29. Site -2252, Feature 2 sluice gate. View to northwest.
Figure 30. Site -2252, Feature 1 ditch and Feature 2 sluice gate. View to south.
Figure 31. Site -2252, Feature 3 sluice gate. View to southwest.
STATE SITE NO. 50-30-10-2253 (TS-4)

This site consists of a single feature: a sugar cane Plantation era irrigating ditch that extends west and southwest from the western stream at Site -2252. This site is outside the project area, in the extended survey area. The ditch terminates at Site -2258, Māhā'ulepū Reservoir. The ditch is entirely earthen and measures 2.0 m wide by up to 1.5 m deep. Site -2253 measures approximately 2,007 feet long and is in poor condition, having been neglected and filled with eroding soils and rocks.

STATE SITE NO. 50-30-10-2254 (TS-5)

The site is a single-feature site consisting of a retaining wall that was constructed of dry stacked, sub-angular basalt cobbles and boulders (Figure 32). The site is present in the project area. Site -2254 was built into the east bank of the east stream descending from above Site -2252. Given that the features comprising Site -2255 (Plantation era culvert bridges) occur to both the north and south of -2254, this retaining wall appears to be associated with them (historic era). The retaining wall measures 7.3 m long by 1.8 m high and the visible ground surface width is up to 1.0 meter. The wall is 6 to 8 courses high, two courses wide, and was built of cobbles on an earthen bench, the latter being a remnant of the original stream bank and bed. This bench or terrace extends 4.0 m north and 4.0 m south from the ends of the wall (Figure 33). The bench extends 1.0 m out from the base of the wall. Both upstream and downstream from Site -2254, the sides of the stream have been excavated so as to make them nearly vertical. Such modifications did not occur at the Site -2254 locale as the wall has kept the slope vertical through time. No artifacts of any era were present within the wall. Also, there was no concrete or coral-based mortar used on this wall. The short wall segment is in fair condition.
Figure 32. Site -2254 retaining wall. View to east.
Figure 33. Plan view of Site --2254 retaining wall.
STATE SITE NO. 50-30-10-2255 (TS-6)

Site -2255 is composed of four (4) culvert bridges crossing over the east stream that descends from above Site -2252. These culverts were designated as Features 1, 2, 3, and 4, with Feature 1 being the most northern of the group. Features 1 and 2 are present to the north of Site -2254 (retaining wall) and Features 3 and 4 are south of the wall. Site -2255 occurs in the project area.

Each culvert was constructed in the same way. A corrugated metal pipe, measuring 1.3 m in diameter, is placed directly at the base of the ditch. Packed earth extends from each bank to the pipe, to a height of 0.50 m, with the remainder composed of small boulder-sized, quarried basalt.

Feature 1 measures 6.5 m north-south by 6.0 m and is 2.0 m high from the road surface to the base of the ditch. The bridges long axis is 340 degrees. From the southwest corner of Feature 1 to the southeast corner of Feature 2, the distance is 52 m.

Feature 2 measures 5.8 m east-west by 4.5 m north-south and is 2.4 m high from road surface to the base of the ditch (Figure 34 and Figure 35). The bridge long axis is 90 degrees.

Feature 3 measures 6.1 m east-west by 5.8 m north-south and it is 2.4 m high from road surface to the base of the ditch (Figure 36 and Figure 37). The bridge long axis is 90 degrees. Feature 3 is present 44 m from Feature 4.

Feature 4 measures 6.0 m east-west by 5.6 m north-south and it is 2.9 m high from road surface to the base of the ditch. The bridge long axis is 90 degrees. Feature 4 is approximately 25 m north of the junction of the two streams that pass to either side of Site -2252 (ditch, sluice gates).
Figure 34. Sites -2254 and -2255, Feature 2. View to north.
Figure 35. Plan view of Site -2255, Feature 2.
Figure 36. Site -2255, Feature 3. View to south.
Figure 37. Plan view of Site -2255, Feature 3.
STATE SITE NO. 50-30-10-2256 (TS-7)

Site -2256 is composed of a concrete bridge crossing over the west stream that descends from above Site -2252. The bridge is present in the project area. The bridge itself was manufactured of poured and formed concrete, with a 0.2 m raised curb along each edge. The bridge measures 5.3 m north-south by 5.0 m east-west. The height from the top of the curb to the base of the stream is 3.6 m. The long axis of the bridge is 20 degrees (Figure 38).

Both stream banks have retaining walls supporting the bridge (Figure 39). These are constructed of boulder-sized, quarried basalt and are mortared or cemented together. The wall faces are 3.6 m apart. The base of the west end, of the northern wall is weathered. A surprisingly large tree root is protruding out of the south wall's face. There are no trees remaining on the surface in this area, but there are several dead or cut trees rooted in the stream bed and banks in the immediate vicinity.

The stream bed of the western stream, north and south from the bridge, is deeper and not as modified as the eastern stream. Also, the western stream bed is nearly covered by both water worn basalt and sub-angular basalt. The eastern branch had perhaps 10% of these materials. The eastern branch may have had these materials removed during plantation maintenance. The mix of materials in the west branch suggests that not only was this a flowing stream, but that the other materials may have been pushed into the stream when fields were being cleared. It is possible that those materials were from traditional features such as walls, mounds, or terraces and platforms. The junction of the two streams is 110 m and 150 degrees from Site -2256.

STATE SITE NO. 50-30-10-2257 (TS-8)

Site -2257, occurring within the project area, is a retaining wall similar to Site -2254 but is not as well preserved (Figure 40). The feature is constructed of dry stacked, sub-angular basalt cobbles and boulders and is 7.5 meters northwest to southeast, built into the south bank of the Main East ditch's western stream. The width of the surface is approximately 1.0 m. However, the terminus of the southeastern end has partially collapsed and stacked cobbles and boulders are visible in the collapsed bank, suggesting that the internal width is greater than that of the surface. The retaining wall is 4.0 m tall and composed of up to 6 courses of cobbles and small boulders, extending from ground surface to stream bottom. As with Site -2254, there is a bench or terrace present upon which the wall was built. This short segment also appears to shore up the ditch in this area as it continued to function well through time, at least until present times. It is interpreted to be associated Historic times and is in very poor condition.
Figure 38. Plan view of Site 2256 bridge concrete deck and floor.
Figure 39. Plan view of Site -2256 bridge retaining walls.
Figure 40. Site -2257 retaining wall remnant. View to southwest.
STATE SITE NO. 50-30-10-2258 (TS-9)

Site -2258 consists of the Māhāʻulepū Reservoir (Figure 41), occurring outside the project area. Built early in the 20th century, it is unknown if there was a spring at this location. The reservoir is large, measuring c. 200 m in diameter. During the time of the field survey in July, 2014 the water level appeared low. The south and east sides of the reservoir are bordered by high, long, and wide dikes or levees. The ground level ascends to the north and west and so additions were not required on these sides. A metal catwalk extends from the southern dike into the reservoir. This is part of the irrigation pipe and pump system that releases water into the Main western ditch that feeds the taro fields at the south end of the valley. The base and flanks of the reservoir are all earthen, compacted soil with no physical architecture supporting the flanks. The reservoir is a man-made construction and likely took some time, given its breadth and depth (c. 4+ meters). It is not known if the reservoir is at its original size or was expanded through time. The reservoir functioned in concert with the many ditches and irrigation works occurring throughout the valley and documented herein.

STATE SITE NO. 50-30-10-2259 (TS-10)

Site -2259 consists of a Plantation-era irrigation ditch that extends southward from Site -2258 along the base of a slope at the western side of Māhāʻulepū Valley. Site -2259 occurs outside the project area. The earthen ditch is c. 2 m wide and extends near the northern borders of the survey area (Figure 42). The feature is similar in design, measurement, and function to Site -2251. The ditch measures 2.0 m wide and the depth varies up to 2.5 m deep. The length of the ditch is approximately 1,020 m (3,323 ft.) and extends south from the reservoir.

STATE SITE NO. 50-30-10-2260 (TS-11)

Site -2260, occurring outside the project area, is an historic bridge that crosses over a natural stream that enters Māhāʻulepū Valley from the western ridge (Figure 43). The stream originates between named peaks, Kalaeakohani to the south and Kolopa to the north. Like the streams entering the valley from the north, this watercourse has been modified upon its entrance into the valley. The bridge surface is comprised of two concrete slabs measuring 7.5 m north-south by 3.0 m east-west and are 0.2 m thick. The long axis is oriented at 210 degrees and the slabs have a 0.1 m gap between them. The west side of the bridge is not modified. The east side of the bridge has a concrete curb that extends 6.8 m and 0.31 m wide. The interior height of the bridge is 0.56 m, while the exterior height is 0.89 m. An iron railing is affixed to the top of the curb. This railing appears to be from the narrow gauge railroad that once extended along the southwestern flank of Māhāʻulepū Valley. Within the stream bed, there are remnants of dry
stacked basalt cobble retaining walls on the north and south banks of the west side of the bridge. The walls are composed of cobbles and small boulders extending up to 12 courses high. Inscribed on the exterior face of the curb is the number or date “1951”, with a flourish on the upper bar of the “5” (Figure 44 through Figure 44).
Figure 41. Site -2258 reservoir. View to north.
Figure 42. Site -2259 ditch. View to west.
Figure 43. Site -2260 bridge. View to west.
Figure 44. Site -2260 bridge date. View to southwest.
Figure 45. Plan view of Site -2260 bridge attributes.
Figure 46. Plan view of Site -2260 bridge.
STATE SITE NO. 50-30-10-2261 (TS-12)

Site -2261, occurring outside the project area, consists of a bridge crossing over the Main East ditch at the southern end of the survey area. Māhā'ulepū Road crosses the bridge (Figure 47). This bridge is unique to the project area in that it shows two distinct phases of construction. The bridge measures 10 meters east-west by 8.5 m north-south, with each style of construction composing approximately half of the bridge.

The northern half of the bridge is constructed of boulder-sized, quarried basalt which are mortared into place to form retaining walls on the east and west stream banks, as well as the north and south flanks. The northern side is clearly visible from the fields and road to the north but the southern side must be viewed from within the stream bed. Both of these sides show an artisan's flair in that there is an arch to the bridge that is not seen on any other feature within the valley. On the north edge of the bridge surface there is a concrete curb with a basalt cobble alignment upon it. Inscribed in the surface of the concrete is “July 30, 1908”. There is 0.35 m of gravel and dirt forming the road above the concrete. From road surface to the base of the stream bed measures 2.4 meters.

The southern half of the bridge is constructed entirely of concrete. Concrete retaining walls line both banks of the watercourse. These descend 1.9 m to an extended 0.5 m foundation on the stream bed. On the southern side of the concrete bridge is a concrete curb which is 0.9 m high and extends to the surface of the concrete retaining walls. An iron rail is affixed to its surface, which is similar to that at Site -2260. Clearly, the narrow gauge railroad along the southern portion, of the western half of the valley, was dismantled. Salvaged materials were utilized for other plantation projects. On the southern face of the concrete curb there is the inscription “1951”, again with a flair on the upper bar of the 5 (Figure 48). “1951” appears to be the year in which many modifications occurred on the plantation. No other bridge found during the AIS shows such obvious evidence of additional phases of construction.
Figure 47. Site -2261 bridge, showing 1908 section and 1951 section. View to northeast.
Figure 48. Site -2261 bridge date. View to south.
STATE SITE NO. 50-30-10-2263 (TS-14)

Site -2263 consists of a bridge crossing over the Main East Ditch, inside the project area, on the east-west extent of Māhā'ulepū Road. The bridge is adjacent to, and northwest of, the many LCA awards at the center of the valley. The site is a culvert bridge which appears to have been built in stages (Figure 49). The base within the streambed consists of 3 to 4 courses of boulder-sized, quarried basalt which are mortared on either side of a concrete culvert, the latter which measures 1.0 m in diameter. The culvert appears to be younger in origin than the walls to either side. The mortared blocks extend halfway up the side of the concrete culvert. On them are dry stacked, sub-angular, vesicular basalt boulders which extend from 0.5 m to 1.5 m above the stream bed. On top of this are boulders of a similar type which are mortared together and extend from 1.5 m to 2.0 m above the stream bed (Figure 50). Additionally, along the western side of the large culvert are two smaller concrete culverts, one above the other. This culvert bridge appears to have been constructed and provided with additions over time.

STATE SITE NO. 50-30-10-2264 (TS-15)

Site -2264, occurring inside the project area, is the remnant of an irrigation pipe that appears to have crossed over the Main East Ditch, immediately south of the location where the east and west streams that pass Site -2255 join together. There is a partially collapsed concrete foundation on the east side of the ditch, with a corrugated metal pipe 0.6 m in diameter extending 0.9 m from it (Figure 51). The intact remnant of the concrete foundation measures 2.2 m north-south by 1.0 m east-west and is 0.6 m high. On the far bank, concrete rubble is present. Upstream from this point, the stream beds are dry, but downstream there is an increasing water flow. It is unclear at present if the source of the flow is from the pipe or from a spring within the stream bed.
Figure 49. Site -2263 bridge. View to south.
Figure 50. Plan view of Site -2263, retaining walls and culverts.
Figure 51. Site -2264 culvert and pipe. View to northeast.
STATE SITE NO. 50-30-10-2262 (TS-16)

Site -2262, occurring outside the project area, is composed of three features and was identified in the northwestern portion of Māhāulepū Valley (Figure 52). This site was identified during August, 2014 sweeps of the extended survey area. Feature 1 consists of an irrigation flume constructed of concrete foundations, a trestle of wooden beams, a concrete bridge, a concrete wall that extends east and west from the southern end of the bridge, and an open-topped metal culvert (Figure 53 through Figure 59). The overall length of the entire structure is 14.0 m and the overall width is 2.3 meters. The culvert measures 14.0 m long by 1.0 m wide and is 0.5 m deep. The supporting concrete bridge is 14.0 m long by 1.5 m wide and is 0.2 m thick. The southern concrete foundation measures 2.0 m long by 0.45 m wide and is 0.85 m tall. The long axis is oriented east-west. The southern foundation contains a trestle of wooden beams on top that support the base of the concrete bridge. The northern concrete foundation measures 2.3 m long by 0.45 m wide and is 2.5 m tall. The north foundation directly supports the base of the concrete bridge. The base of the concrete bridge is 3.2 m above the base of the irrigation ditch (Site -2253) that the flume crosses over. The ends of the flume are within a stream course which descends from the north into the valley. This stream course eventually braids with the two courses to the east and forms Māhāulepū Ditch. Each branch of the concrete wall extending east and west from the south end of the concrete bridge measures 2.0 m long by 0.45 m high and is 0.15 m thick. Feature 2 extends from the eastern flank of the east wall.

Feature 2 consists of a concrete sluice gate. The overall length is 3.0 m, with the central opening measuring 1.0 m wide. The concrete side walls measure 1.0 m long by 0.45 m tall and are 0.15 m thick. Where the walls face each other, the concrete is grooved vertically, but there is no remnant of a metal or wooden gate. The opening faces east. On top of the south wall “J Torre” is inscribed into the concrete. On top of the north wall is the inscription “1924”.

Feature 3 consists of a pair of sluice gates located to the south of, but not contiguous with Feature 2. They are placed at the end of a short ditch extending away from the stream course. The walls of this ditch are paved with concrete. At the gates, there is a central concrete pillar separating the openings, as well as concrete walls extending away from the opening. Basalt cobbles support the exterior of the concrete walls. A narrow gauge railroad rail is incorporated into the top of, but not on top of, both walls and the column. Each gate opening measures 0.6 m wide by 0.9 m tall, from the base of the ditch to the top of column. The column measures 0.2 m on each side and is 0.9 m tall. Each concrete wall measures 0.7 m long by 0.2 m wide by 0.9 m tall. The ends of the concrete walls facing the column and the corresponding faces of the column
are grooved vertically but there is no remnant of a metal or wooden gate. Inscribed into the concrete surface of the north wing wall is “Koloa Plantation, April 12/24 By D.S.K.”.

Site -2262 crosses over Site -2253, to the northeast of Site -2258, Māhā’ulepū Reservoir. Site -2253 is an irrigation ditch which terminates at the reservoir on its south end and connects to Site -2252 on its north end. The north and south ends of Site -2262 are within a streambed that descends from the north. Site -2262 was built after the excavation of Site -2253. Site -2262 has multiple functions: to carry stream water over the irrigation ditch and continue its flow into the valley as a source for Māhā’ulepū Ditch. With three mountain born water sources braided together at the north end of the valley floor, the original Māhā’ulepū Stream, later modified to become Māhā’ulepū Ditch, would have been a substantial water course even prior to the sugar cane industry.

The sluice gates of Features 2 and 3 face eastward. Flow from the stream would have emptied into Site -2253, the irrigation ditch and presumably carried it to Site -2258, Māhā’ulepū Reservoir. The date of the inscriptions at both gates gives the year “1924”. This shows that excavation of the ditch that incorporates Sites -2251, -2252, -2253, and -2259 predates the construction of -2262. The concrete bridge of Feature 1 is collapsed upon the northern concrete foundation. The wooden trestle is standing but the beams are rotting.
Figure 52. Plan view of Site -2262.
Figure 53. Plan view of Site -2262, Feature 2 retaining features.
Figure 54. Plan view of Site -2262, Feature 3 retaining walls.
Figure 55. Google Earth aerial imagery of Site -2262 in relation to Sites -2253 and -2258.
Figure 56. Site -2262 structural supports of the flume. View to east.
Figure 57. Site -2262 north bank foundation. View to north.
Figure 58. Site -2262 flume system. View to northeast.
Figure 59. Site -2262 double gate with cement and rock wall to prevent erosion. View to north.
Site 3094 consists of a previously identified petroglyph rock (designated as Feature 1), along with two other petroglyph rocks (designated as Feature 2 and Feature 3) that were identified during the current survey. All three features occur outside the project area, in the extended survey area. Feature 1 consists of a large boulder with petroglyphs that was previously identified. Feature 2 is either exposed bedrock or a buried boulder with two petroglyphs visible located 20 m southeast from, and in the same clearing as Feature 1. Feature 3, which was identified by the SHPD-Kaua‘i representative during a field visit in 2014, is located approximately 70 m to the northeast of Feature 1, and is at the base of the wooded slope in the extended survey area.

The area surrounding Feature 1 is currently covered by tall grasses (Figure 60). Excavation of test trenches during this AIS showed that the ground east, north, and west of Feature 1 had been plowed for the cultivation of sugar cane. To the south, however, the test trench exposed intact natural stratigraphy. The area south from the boulder extends to one branch of the southward flowing Māhā‘ulepū Stream. This confined area, the absence of disturbed soils, and the absence of any signs of impact by machinery on the boulder suggest that care had been taken not to disturb the boulder.

Feature 1 measures 4.0 m long by 3.8 m wide, with the long axis north to south. The boulder is 1.1 m high at its northern end, 1.3 m at its center, and ranges from 0.6 to 0.8 m high at the southern end. The eastern, northern and southern faces are vertical, while the southern end slopes steeply in the ground surface. The ground to the south is at a slightly higher elevation than the boulder, and the ground slopes away from the boulder in the other directions. The high center of the boulder is an east to west extending ridge across the top of the boulder. From this crest, the top surface of the boulder is smooth and descends gradually northward. On the east and northwest sides of the surface, the surface slopes slightly before turning into vertical faces. The remaining sides of the boulder are all vertical to the top surface. South from the crest, the slope is shorter, steeper, and the surface is rough and pockmarked from natural causes.

At the crest of the ridge is a pecked cup or basin measuring 0.1 m in diameter and 0.1 m deep. From this cup is a pecked groove approximately 0.03 m wide and approximately 0.01 m deep that descends northward in a gradual curve across the surface of the boulder, ending at the northwest side. Parallel to this groove is a natural bifurcated fissure that descends with one branch ending at the northwest end of the boulder next to the groove and the other branch ending at the northeast end (Figure 61).
Figure 60. Plan view of Site -3094, Feature 1 overview.
Petroglyphs representing human figures are pecked into four vertical faces, two sloped faces, and the top surface of the north end of the boulder. On the top surface, there are figures on either side of the groove, and all sides of the fissure, and one is placed between the groove and the fissure. These were documented and illustrated as separate panels but the panels are regarded as being part of the whole entity of the boulder (Figure 62 through Figure 72).

The vertical and sloped panels each have between one and three figures, while the top surface has a total of seven figures. Some panels have pecked areas and/or lines as well. What these pecked areas represent is not currently understood. The petroglyphs are stick figured and limbed, with round heads. There are figures with extensions at the ends of limbs and at least one has male genitalia represented. The figures vary in size but do not exceed 0.3 m in length or width.

There are no figures on the slope south from the crest but there is a second pecked basin or cup, this one at the base of the slope. It has the same dimensions as the one at the crest, but there are no associated figures, grooves, or fissures.

The meaning of these petroglyphs and their placements on the boulder is open to interpretation. One interpretation is that, despite being oriented in the opposite direction, the crest represents Ha'upu Ridge, and Mount Ha'upu, and the groove represents Māhā'ulepū Stream as it descends and curves to the coast (Ching et al. 1974). The basins may represent head waters to streams. The petroglyphs may represent population centers, chieftains or the divine. The fissure, being natural, may represent either another stream course, or perhaps a ridgeline. Another interpretation is that these are all representing someplace on Kaua'i where a stream actually does flow north. It may be that all of this represents some facet of navigation, ceremony, cosmology, or documentation of events which we do not as of yet understand.

During the current AIS, a second feature with petroglyphs was identified (N457372, E2423831). Feature 2 was identified by the backhoe driver as he was clearing grasses in the area to conduct trenching around the Feature 1 boulder. Feature 2 is located 20 m (at 140 degrees) from Feature 1. This second “boulder” is only slightly exposed at ground surface and may actually be a natural basalt outcrop. Feature 2 measures 1.5 m in diameter and rises only 0.2 m above the current ground surface. The exposed rock measures 1.72 m (north flank) by 1.98 m (east side). The figures on Feature 2 are different, and not as clearly defined, as those on Feature 1. There is a stick-figured human standing legs apart and wide-armed, holding what appears to be a spear upright in his right hand. Perpendicular to this is a three-leafed image on a staff, possibly a kahili image. Neither of these are as clearly defined as those on the larger Feature 1.
boulder, which is not surprising considering it occurs on the surface of the fields. Other scratches on the surface of Feature 2 are indistinct (Figure 71).

Because Feature 2 is at ground surface level, and because there are fewer, less distinct images, it appears that the markings on Feature 2 were etched for a different purpose than those on Feature 1. If the figure is a kahili, then this could indicate the area being decreed kapu. A kapu could be seasonal, periodical, or eternal. This may explain why the main boulder was left intact and in situ throughout the Kingdom and the modern era. The figure that appears to be holding a staff or spear is not as distinct as those figures on Feature 1. None of the Feature 1 figures appear to be holding anything.

Feature 3 is located 70 m to the north/northeast of Features 1 and 2, in the extended survey area. This boulder measures 2.5 m by 2.1 m by 1.7 m tall, with its long axis northeast to southwest (Figure 72). Feature 3 contains etchings of several human figures with stick torsos and limbs. These are located on the mauka face of a large, slab-like boulder. The figures of Feature 3 are slightly larger than those of Feature 1. The meaning and purpose of Feature 3 is open for interpretation, but likely represents individuals of the area.
Figure 61. Plan view of Site -3094, Feature 1 Panel A.
Figure 62. Plan view of Site -3094, Feature 1 Panel C.
Figure 63. Plan view of Site -3094, Feature 1 Panel G.
Figure 64. Plan view of Site -3094, Feature 1 Panel H.
Figure 65. Plan view of Site -3904, Feature 1 Panel I.
Figure 66. Plan view of Site -3094, Feature 1 Panel J.
Figure 67. Site -3094, Feature 1, petroglyph boulder in field. View to east.
Figure 68. Site -3094, Feature 1, surface of petroglyph boulder. Note groove down center and anthropomorphic figures on either side of groove. View to south.
Figure 69. Site -3094, Feature 1, Petroglyphs, north side of boulder. View to south.
Figure 70. Site -3094, Feature 1, petroglyphs and pecked cup at east end of boulder. View to west.
SITE 3094 FEATURE-2 PETROGLYPH PLAN VIEW

Figure 71. Plan view of Site -3094, Feature 2 petroglyph panel.
Figure 72. Plan view of Site -3094, Feature 3 petroglyph panel.
STRATIGRAPHIC TRENCH EXCAVATIONS

Stratigraphic trench excavations were conducted mechanically with a backhoe in areas within and around historically interesting areas, one known site (Site -3094), and proposed effluent ponds along the western flank of the project area (Figure 73). Several of the trenches were concentrated near the cluster of LCA’s located on the east side of the Main East Ditch. These LCAs were awarded during the Great Māhele in 1848 and were occupied and/or utilized until approximately the 1880s, when individual ownerships passed over to group and corporate development for the Koloa Sugar Cane Plantation.

A total of nine (9) trenches were mechanically excavated within the exact location of the former LCA cluster area. The trenches, designated Stratigraphic Trenches (ST), were numbered sequentially and excavated in rows of three. The southernmost row, ST-1 to ST-3 was excavated east to west. The middle row, ST-4 to ST 6, was excavated west to east. The northernmost row, ST-7 to ST-9, was excavated east to west. This area is identified on the soils map as P-131 through P-134. To the east from this point, P-135 to P-137 is currently marshland and an excavator could not safely be brought in to excavate. The previously noted soils map identified the soils exposed by ST-1 through ST-9 as KavB or Kaena Clay, Brown Variant.

The next area of excavation occurred around Feature 1 of Site -3094, the previously-identified petroglyph boulder. Four (4) trenches were mechanically excavated here. This area is identified on the soils map as P-120. The soils map identified the soils exposed by ST-10 through ST-13 as HsD or Hanamaulu Silty Clay.

A single trench was excavated east of the -2254 retaining wall in an attempt to find remnants of a historic household that is shown on older maps of the area. This area is identified on the soils map as P-161 and P-162. The soils map identified these soils as KavB or Kaena Clay, Brown Variant.

Trenches were desired on a small knoll at the northwest turn of Māhā’ulepū Road. On older maps of the area, this location is designated as “Camp”, but no further explanation is provided. However, a trench with water lines is present alongside the road and prevented access to this area. Alternatively, two trenches were excavated to the southeast of the knoll, in the fields south of existing pump station structures. These structures service a series of wells known as Māhā’ulepū 14, drilled during the 20th century to service irrigation for the plantation. This area is identified on the soils map as P-103. The soils map identified the soils as KavB or Kaena Clay, Brown Variant.
Figure 73. USGS Map depicting stratigraphic trench locations.
A final trench was excavated within the area of the Effluent Ponds and other infrastructure proposed to be constructed for the project. This area is identified on the soils map as P-201 and soils are also identified as KavB or Kaena Clay, Brown Variant.

**SPECIFIC TRENCHING METHODS**

All trenches were excavated with use of a small, tracked, excavator. Each trench was 10.0 m long (9.14 m being the average open space, the remaining 0.86 consisting of the ramp into the trenches) and the width of the bucket, 0.75 m wide. Depth of the trenches varied, depending on the water table. If the table was encountered, excavation was halted. If the water table was not encountered, excavation extended to 2.0 m below the ground surface for the first 2.0 m of the trench, and then was reduced to 1.5 m for the remainder. In every trench, the uppermost 0.2 to 0.8 m below ground surface was composed of grey brown loam with fine grass roots. This was identified as a disturbed plow zone. The trenches excavated in rows in the LCA area were 20 m apart and the rows were approximately 40 m apart. Each trench was documented with soil descriptions, profiles, written descriptions, and photographs.

At each trench location, an area approximately 15 m wide and long was cleared by the excavator down to the ground surface. This was done to allow complete views of the interior of the trench, to expose areas around it in the event of additional excavations, and in order to facilitate greater ease and access when back filling was undertaken.

A total of seventeen (17) stratigraphic trenches were mechanically excavated. The greatest concentration of these was within the area identified as containing numerous LCA properties. The second largest concentration was around Site 3094. No cultural materials or features were exposed during any of these excavations. Appendix A provides stratigraphic profiles and representative photographs of the trenches.

**PROJECT AREA**

**Stratigraphic Trench 1 (ST-1)**

ST-1 measured 9.14 m long, 0.6 m wide, and was oriented at 120/300 degrees. The trench was excavated to a maximum depth of 1.52 m at the north end and 1.8 m at the south end. Three stratigraphic layers were identified. Layer I (0.0-0.16 mbs) is composed of dark brown (10YR 3/5) silty clay that was structureless, slightly plastic, and included roots, rootlets, and less than 1% gravel. Lower boundary was abrupt and wavy. Layer II (0.16-0.56 mbs) is a dark grayish brown (10YR 4/2) clay, structureless, plastic, less than 1% roots and gravel. Layer III (0.56-1.5/1.8 mbs) consisted of dark grayish brown (10YR 4/2) clay that was structureless, plastic, with no roots and no gravel. The water table was exposed at the base of the excavation. This
trench was located in the center of the project area, east of Māhā'ulepū Ditch, and south of Māhā'ulepū Road.

**Stratigraphic Trench 2 (ST-2)**

ST-2 measured 9.14 m long and 0.6 m wide and was oriented at 180/360 degrees. The trench was excavated to a maximum depth of 1.52 m at the north end and 1.8 m at the south end. Three stratigraphic layers were identified. Layer I (0.0-0.16 mbs) is a dark brown (10YR 3/5) silty clay that was structureless, slightly plastic, and included roots, rootlets, and less than 1% gravel. Lower boundary was abrupt and wavy. Layer II (0.16-0.56 mbs) is a dark grayish brown (10YR 4/2) clay that is structureless, plastic, less than 1% roots and gravel. The lower boundary was clear and wavy. Layer III (0.56-1.5/1.8 mbs) consisted of dark grayish brown (10YR 4/2) clay that was structureless, plastic, with no roots and no gravel. The water table was exposed at the base of this excavation. This trench was located in the center of the project area, east of Māhā'ulepū Ditch and south of Māhā'ulepū Road.

**Stratigraphic Trench 3 (ST-3)**

ST-3 measured 9.14 m long and 0.6 m wide and was oriented at 180/360 degrees. The trench was excavated to a maximum depth of 1.52 m at the north end and 1.8 m at the south end. Three stratigraphic layers were identified. Layer I (0.0-0.16 mbs) is composed of a dark brown (10YR 3/5) silty clay that was structureless, slightly plastic, and included roots, rootlets, and less than 1% gravel. Lower boundary was abrupt and wavy. The lower boundary was clear and wavy. Layer II (0.16-0.56 mbs) was a dark grayish brown (10YR 4/2) clay that was structureless, plastic, less than 1% roots and gravel. The lower boundary was clear and wavy. Layer III (0.56-1.5/1.8 mbs) consisted of dark grayish brown (10YR 4/2) clay that was structureless, plastic, with no roots and no gravel. The water table was exposed at the base of this excavation. The trench was located in the center of the project area, east of Māhā'ulepū Ditch and south of Māhā'ulepū Road.

**Stratigraphic Trench 4 (ST-4)**

ST-4 measured 9.14 m long and 0.6 m wide and was oriented at 20/160 degrees. The trench was excavated to a maximum depth of 1.52 m at the north end and 1.8 m at the south end. Three stratigraphic layers were identified. Layer I (0.0-0.16 mbs) is composed of a dark brown (10YR 3/5) silty clay that was structureless, slightly plastic, and included roots, rootlets, and less than 1% gravel. The lower boundary was abrupt and wavy. Layer II (0.16-0.56 mbs) is a dark grayish brown (10YR 4/2) clay that was structureless, plastic, less than 1% roots and gravel. The lower boundary was clear and wavy. Layer III (0.56-1.5/1.8 mbs) consisted of dark grayish brown (10YR 4/2) clay that was structureless, plastic, and with no roots and no gravel. The water
table was exposed at the base of this excavation. This trench was located in the center of the project area, east of Māhā'ulepū Ditch and south of Māhā'ulepū Road.

**Stratigraphic Trench 5 (ST-5)**

ST-5 measured 9.14 m long and 0.6 m wide and was oriented at 90/270 degrees. The trench was excavated to a maximum depth of 1.52 m and exposed two stratigraphic layers. Layer I (0.0-0.3m) was a dark brown (10YR3/5) silty clay that was structureless, slightly plastic, and included roots, rootlets, and less than 1% gravel. The lower boundary was abrupt and wavy. Layer II (0.3-1.52m) was a dark brown (10YR 3/3) clay with no roots and no gravel. The water table was exposed at the base of this excavation. This trench was located in the center of the project area, east of Māhā'ulepū Ditch and south of Māhā'ulepū Road.

**Stratigraphic Trench 6 (ST-6)**

ST-6 measured 9.14 m long and 0.6 m wide and was oriented at 180/360 degrees. The trench was excavated to a maximum depth of 1.52 m and exposed five stratigraphic layers. Layer I (0.0-0.3m) was composed of dark brown (10YR3/5) silty clay that was structureless, slightly plastic, and included roots, rootlets, and less than 1% gravel. The lower boundary was abrupt and wavy. Layer II (0.3-0.6 m) is a dark brown (10YR 4/2) clay that was structureless, plastic and had no roots or gravel. The lower boundary was clear and wavy. Layer III (0.6-1.0 m) is a brown (10YR4/3) clay that was structureless, plastic, and had no roots or gravel. The lower boundary was clear and wavy. Layer IV (1.0-1.2 m) is a dark grayish brown (10YR 4/2) clay that was structureless, plastic, and had no roots and no gravel. The lower boundary was clear and smooth. Layer V (1.2-1.5 m) is a brown (10YR 4/3) clay that was structureless, plastic, and had no roots or gravel. The water table was reached at 0.9 m below the ground surface. This trench was located in the center of the project area east of Māhā'ulepū Ditch and south of Māhā'ulepū Road.

**Stratigraphic Trench 7 (ST-7)**

ST-7 measured 9.14 m long and 0.6 m wide and was oriented at 90/270 degrees. The trench was excavated to a maximum depth of 1.52 m and exposed four stratigraphic layers. Layer I (0.0-0.2 m) is a dark brown (10YR3/5) silty clay that was structureless, slightly plastic, and included roots, rootlets, and less than 1% gravel. The lower boundary was abrupt and wavy. Layer II (0.2-0.5 m) is a yellow brown (10YR 5/4) clay that was structureless, plastic, and had no roots and no gravel. The lower boundary was abrupt and wavy. Layer III (0.5-0.73 m) is a black clay that was structureless, plastic, and had no roots and no gravel. The lower boundary was abrupt and wavy. Layer IV (0.73-1.52 m) is a brown (10YR4/3) clay that was structureless, plastic, and had no roots or gravel. The water table was exposed at the base of the excavation. This trench was located in the center of the project area east of Māhā'ulepū Ditch and south of Māhā'ulepū Road.
Stratigraphic Trench 8 (ST-8)

ST-8 measured 9.14 m long and 0.6 m wide and was oriented at 180/360 degrees. The trench was excavated to a maximum depth of 1.8 m and exposed three stratigraphic layers. Layer I (0.0-0.2 m) is a dark brown (10YR4/3) silty clay that was structureless, slightly plastic, and included roots, rootlets, and less than 1% gravel. The lower boundary was abrupt and wavy. Layer II is a yellowish brown (10YR5/6) clay that was structureless, plastic, and had no roots or gravel. The lower boundary was clear and smooth. Layer III was a bluish gray (Gley 2 5/1) clay exposed, with the water table, at the base of the excavation. This color clay was not exposed in any other excavation and simply represents water saturated soils. This trench was located in the center of the project area east of Māhā’ulepū Ditch and south of Māhā’ulepū Road.

Stratigraphic Trench 9 (ST-9)

ST-9 measured 9.14 m long and 0.6 m wide and was oriented at 90/270 degrees. The trench was excavated to a maximum depth of 1.8 m and exposed two stratigraphic layers. Layer I (0.0-0.2 m) is composed of dark brown (10YR4.3) silt that was structureless, slightly plastic, and includes roots, rootlets, and less than 1% gravel. The lower boundary was abrupt and wavy. Layer II (0.2-1.5 m) is a yellowish dark brown (10YR4/4) clay that was structureless, plastic and had no roots or gravel. The water table was exposed at the base of the excavation. This trench was located in the center of the project area east of Māhā’ulepū Ditch and south of Māhā’ulepū Road.

Stratigraphic trench 14 (ST-14)

ST-14 measured 9.14 m long and 0.6 m wide and was oriented at 20/200 degrees. The trench was excavated to a maximum depth of 1.8 m and exposed two stratigraphic layers. Layer I (0.0-0.4 m) was composed of dark brown (10YR4/3) silty clay that was structureless, slightly plastic, and included no roots and less than 1% gravel.. The lower boundary is abrupt and wavy. Layer II (0.4-1.8 m) is a dark yellowish brown (10YR3/6) clay that was structureless, plastic and contained no roots or gravel. The water table was not exposed in this excavation. This trench was located to the east of the fork in the Māhā’ulepū Ditch.

Stratigraphic Trench 15 (ST-15)

ST-15 measured 9.14 m long and 0.6 m wide and was oriented at 180/360 degrees. The trench was excavated to a maximum depth of 1.8 m and exposed three stratigraphic layers. Layer I (0.0-0.1 m) was composed of dark brown (10YR4/3) silty clay that was structureless, slightly plastic, and included roots, rootlets, and less than 10% gravel. The lower boundary is abrupt and wavy. Layer II (0.1-0.46 m) is a dark grayish brown (10YR4/6) clay that was structureless, plastic, and had no roots and less than 1% gravel. The lower boundary is clear and wavy. Layer III (0.46-1.52 m) is a dark grayish brown (10YR4/2) clay that was structureless, plastic, and had
no roots or gravel. Layer III was moist but the water table was not exposed in this excavation. This trench was located immediately south of the pumping station of the “Māhā‘ulepū 14” wells at the northwest end of the property where Māhā‘ulepū Road turns to the east.

**Stratigraphic Trench 16 (ST-16)**

ST-16 measured 9.14 m long and 0.6 m wide and was oriented at 0/360 degrees. The trench was excavated to a maximum depth of 1.8 m and exposed three stratigraphic layers. Layer I (0.0-0.16 m) was composed of dark brown (10YR4/3) silty clay that was structureless, slightly plastic, and included roots, rootlets, and less than 10% gravel. The lower boundary is clear and wavy. Layer II (0.16-0.82 m) is a dark grayish brown (10YR4/2) clay that was structureless, plastic, and had no roots and less than 1% gravel. The lower boundary is clear and wavy. Layer III (0.82-1.52 m) is a dark grayish brown (10YR4/2) clay that was structureless, plastic, and had no roots or gravel. The water table was not exposed in this excavation. This trench was located in the proposed Effluent Pond area along the western side of the project area.

**Stratigraphic Trench 17 (ST-17)**

ST-17 measured 9.14 m long and 0.6 m wide and was oriented at 0/360 degrees. The trench was excavated to a maximum depth of 1.8 m and exposed four stratigraphic layers. Layer I (0.0-0.05 m) was composed of dark brown (10YR4/3) silt that was structureless, slightly plastic, and included grass roots and no gravel. The lower boundary was abrupt and smooth. Layer II (0.05-0.4 m) is a mottled gray (10YR5/2) and dark brown (10YR4/3) clay that was structureless, slightly plastic, and included roots, rootlets, and less than 10% gravel. The lower boundary is clear and wavy. Layer III (0.4-0.88 m) is a dark yellowish brown (10YR4/6) clay that was structureless, plastic, and had no roots or gravel. The lower boundary was clear and wavy. Layer IV (0.88-1.52 m) is a dark gray (10YR4/2) clay. The sediment was structureless, plastic, and included no roots or gravel. The water table was not exposed in this excavation. This trench was located in the proposed Effluent Pond area along the western side of the project area.

**EXTENDED SURVEY AREA**

**Stratigraphic Trench 10 (ST-10)**

ST-10 measured 9.14 m long and 0.6 m wide and was oriented at 100/280 degrees. The trench was excavated to a maximum depth of 1.8 m and exposed two stratigraphic layers. Layer I (0.0-0.4 m) is composed of a dark brown (10YR4/3) silt that was structureless, slightly plastic, and included grass roots and no gravel. The lower boundary was abrupt and smooth. Layer II (0.4-1.8 m) is a yellowish brown (10YR5/8) silt that was fine, slightly plastic, and had no roots or gravel included. The water table was not exposed in this excavation. This trench was located to the north of the petroglyph boulder at Site -3094, Feature 1.
Stratigraphic Trench 11 (ST-11)

ST-11 measured 9.14 m long and 0.6 m wide and was oriented at 180/360 degrees. The trench was excavated to a maximum depth of 1.8 m and exposed two stratigraphic layers. Layer I (0.0-0.4 m) was composed of dark brown (10YR4/3) silt that was structureless, slightly plastic, and included grass roots and no gravel. The lower boundary was abrupt and smooth. Layer II (0.4-1.8 m) is a yellowish brown (10YR5/8) silt that was fine, slightly plastic, and had no roots or gravel included. The water table was not exposed in this excavation. This trench was located to the west of the petroglyph boulder at Site -3094, Feature 1.

Stratigraphic Trench 12 (ST-12)

ST-12 measured 9.14 m long and 0.6 m wide and was oriented at 100/280 degrees. The trench was excavated to a maximum depth of 1.8 m and exposed two stratigraphic layers. Layer I (0.0-0.4 m) was composed of dark brown (10YR4/3) silt that was structureless, slightly plastic, and included grass roots and no gravel. The lower boundary was abrupt and smooth. Layer II (0.4-1.8 m) is a yellowish brown (10YR5/8) silt that was fine, slightly plastic, and had no roots or gravel included. The water table was not exposed in this excavation. This trench was located to the south of the petroglyph boulder at Site -3094, Feature 1.

Stratigraphic Trench 13 (ST-13)

ST-13 measured 9.14 m long and 0.6 m wide and was oriented at 40/220 degrees. The trench was excavated to a maximum depth of 1.8 m and exposed two stratigraphic layers. Layer I (0.0-0.4 m) was composed of dark brown (10YR4/3) silt that was structureless, slightly plastic, and included grass roots and no gravel. The lower boundary was abrupt and smooth. Layer II (0.4-1.8 m) is a yellowish brown (10YR5/8) silt that was fine, slightly plastic, and had no roots or gravel included. The water table was not exposed in this excavation. This trench was located to the east of the petroglyph boulder at Site -3094, Feature 1.

DISCUSSION AND CONCLUSIONS

IDENTIFIED SITES

A total of sixteen (16) sites were identified within the project area and extended survey area. As shown in Table 1 above, six sites occur within the project area (Sites -2254, -2255, -2256, -2257, -2263, and -2264) and ten sites occur outside the project area (Sites -2250, -2251, -2252, -2253, -2258, -2259, -2260, -2261, -2262, and -3094).

Fifteen (15) of the sites were newly identified during the current survey; and one site, a boulder with petroglyphs designated State Site 50-30-10-3094, was re-located in the extended survey area. During pedestrian survey of the extended survey area, a buried boulder or exposed
bedrock outcrop with petroglyphs was identified 20 m to the southeast of the primary boulder (Site -3094, Feature 2). During survey of the extended survey area, approximately 70 m northeast of the primary boulder, a third feature (Site -3094, Feature 3), a large boulder with vertical faces and petroglyphs of human figures was found by the SHPD. These two new features are added to Site -3094 to form the petroglyph complex. All three features occur outside the project area.

**PRE-CONTACT/EARLY HISTORIC PERIOD SITES**

Sites 50-30-10-2250 (enclosure) and -3094 (petroglyphs), both occurring outside the project area, are believed to be associated with pre-Contact and/or early historic occupation. Site 50-30-10-2250 has been identified as an agricultural *heiau*. Multiple test units were placed at this site. No cultural materials were found within the enclosure. However, excavations at several locations along the north and west walls did expose what appear to be foundations for the walls at these locations. Built of sub-angular gravel and cobble sized basalt, these foundations were directly associated with the walls. Excavations within the interior of the enclosure exposed no such deposit, so it is thought that rather than a paving, the deposit represents a construction or engineering component of the *heiau*. Given the location of Site -2250, at the base of Ha'upu ridge, where rain water runoff would have flowed, it would be necessary for walls to have a foundation base course component. One artifact, a lithic chopping tool, was recovered from 20 meters to the east of the enclosure but interpreted as an isolated find with no connection to Site -2250.

Site -2250 has been interpreted herein as an agricultural *heiau* due to its size, construction (uprights, paved foundation), location, and lack of cultural materials normally indicative of a *kau hale* or community *hale*. An agricultural *heiau*, also referred to as *mapele* or Hale O Lono (the god of fertility) is directly associated with ceremonies to insure the fertility of the crops (Handy 1972:386). These *heiau* are often utilized for prayer and meditation, which could explain the lack of cultural materials recovered during excavations of the site.

Examples of other agricultural *heiau* include Kaneaki Heiau in Makaha (O'ahu) and Pahua Heiau in Hawaii Kai (O'ahu). The differences between these agricultural *heiau* and the one documented herein are quite vast though, in terms of monumental construction. While the size of each may be similar, the actual construction was vastly different. Many *heiau*, including the ones mentioned for O'ahu above, often consist of massive amounts of rocks, multiple courses of rocks piled many meters high, and which stand out in complexity and breadth. However, there are many exceptions as *heiau*, in the broader sense, can encompass smaller structures such as small agricultural *heiau* and *ahu*. The current Site -2250 enclosure fits more into this latter
category as it is only monumental in size, not construction, is rather compact, and its outline is clearly defined. The north, east and west walls are two to three courses wide and two to three courses high. Located at the north corner entrance and the bend in the western wall both are upright, small boulders. In terms of energy expenditure, what is viewed today would not have taken much labor to create. However, the structure is solidly constructed and is at present in good condition. The walls are too low for this to have served as an animal pen. Heiau in the area, as noted above, were deconstructed to create cattle pens, pens with much higher walls and greater enclosure space. A cluster of LCA settlements were located several hundred meters to the south of the heiau. It is possible that Site -2250 is associated with some activity from those households. However, Site -2250 is placed at the base of the slope off the ridge, amidst a scattering of boulders that may have been too numerous to move, or that moving them was unnecessary as they were located within a woodland valued for its resources. The structure being built in this location, where it was unnecessary and impractical to dismantle, as well as a healthy respect by residents for something built by their ancestors, may have led to the preservation of this site. That the archaeological record of the site did not allow for dating, due to the lack of cultural materials, charcoal, coral, or midden, will undoubtedly ensure some conversation on the chronology of the site.

Site -3094 consists of a previously identified petroglyph rock, with two other petroglyph rocks (designated as Feature 2 and Feature 3), having been identified during the current survey. Feature 1 is a large petroglyph boulder. Feature 2 is either exposed bedrock or a buried boulder with two petroglyphs visible located 20 m southeast from, and in the same clearing as Feature 1. Feature 3 is located approximately 70 m to the northeast of Feature 1, and is at the base of the wooded slope, with several pecked figures. The petroglyphs are interpreted to be pre-Contact features. Feature 1 is perhaps the most interesting, having a large number of petroglyphs around the rock faces, as well as mortars and carved lines on the top of the rock. During a community site visit in February 2105, a gentleman (K. Pike) noted that the curved lines on the top of the rock, leading from a circular mortar, could indeed be a map of a water spring in the area, with the curved lines representing a drainage. He stated that it could also be that offerings were placed in the mortar, and would “flow” down the curves and back into the lands. Both were viable interpretations and could be equally appropriate.

HISTORIC PERIOD SITES

The remaining sites documented during this AIS within and outside the project area formed an interesting network of features, all associated in some manner with the intensive cultivation of sugar cane in the valley. For example, the two retaining walls, Sites -2254 and -
supported the stream banks so water could continue to flow unimpeded, and are located within two different stream bed branches upstream of where the two braid together forming the main course of Māhā‘ulepū Stream. Both are walls constructed of dry stacked sub-angular basalt cobbles and boulders built into the face of the stream bank and upon earthen terraces at the base of slope into their respective stream beds. Site -2254 appears to be primarily intact. Site -2257 has partially collapsed at its western end but the remainder appears solid. These walls have weathered the course of time well. Of note is that the stream bed containing Site -2254 has been modified in recent years by the construction of Site -2255, four culvert bridges for the conveyance of agricultural equipment. This stream bed was nearly empty of gravels, cobbles, or boulders.

The stream bed containing Site -2257 had an associated historic-era feature, Site -2256, a concrete bridge with retaining walls of boulder sized quarried basalt blocks mortared together with concrete. These retaining walls appear to be contemporaneous with the bridge but appear to post-date Site -2257. Additionally, the stream containing Sites -2256 and -2257 has an abundance of water worn gravels and cobbles, and sub-angular basalt cobbles and boulders strewn along the bed, from where the stream enters the valley to its junction with the other branch of the stream. The mixture of water worn and sub-angular basalt suggests that this stream bed was not so thoroughly modified during plantation operations. It is possible that the function of both of these retaining walls may be related to mid-19th century LCA activities in the valley. The remaining sites consist of features also constructed during various phases of the development of sugar cane cultivation within Māhā‘ulepū Valley. State Site 50-30-10-2261 is a good example of this. The northern component of the bridge is constructed of boulder sized quarried basalt blocks, with an inscription into its concrete surface giving the date “1908”. The southern component is constructed of concrete, with an inscription on the southern face of the curb giving the date “1951”. Furthermore, this southern curb has a metal rail constructed of a narrow gauge rail road rail. A similar rail is affixed to Site -2260, a bridge that also has the date “1951” inscribed into face of its concrete curb. As stated above, Site -2257 has two components, retaining walls of boulder sized quarried basalt blocks mortared together, and a concrete bridge mounted upon them.

All of these are examples of development of the plantation infrastructure proceeding through phases. Quarried basalt walls mortared together post-date traditional dry stacked construction utilizing sub-angular basalt cobbles and boulders. These walls built of quarried basalt in turn pre-date infrastructure built of concrete, but could, as in the case of Sites -2257, and more dramatically, Site -2261, be incorporated into more recent efforts to update the infrastructure of the plantation. Similarly, the utilization of rail road rails into these updates is
telling. The steam driven sugar cane railroads were utilized during the late 19th and early 20th centuries, post-dating the use of draft animals. The rail road lines were designed to be transported and laid into fields where needed during harvest. The use of the rail coincided with the use of steam-powered tractors, which also took over from draft animals. The age of steam came to an end in the third decade of the 20th century, and was replaced by gas, diesel and oil powered vehicles. The use of trucks required the improvement of the infrastructure, in the form of more bridges and roads. As the 20th century proceeded, so too did the improvement in size and power of these vehicles, once again requiring the improvement of the infrastructure. While rail roads were no longer necessary, the rails could still be used in new ways.

The date “1951” inscribed on two bridges is another indicator of change. The plantation flourished with the world economy, doing well in the early 20th century up until The Great Depression. Followed by the tumult of World War II, it would have been a leaner decade for landowner Koloa Plantation than hoped for. This may have led to the sale of the plantation from Koloa Plantation to Grove Farm in 1948. Improvement of the infrastructure by the new owners is marked by the inscription of the date, “1951” during which some of these improvements occurred.

The development of fuels for engines beyond steam power also allowed for improvements to irrigation. Not having to rely on gravity, rainfall, wind power or steam engines, wells could be drilled and the water pumped from well stations into places such as Site -2258, the Māhā'ulepū Reservoir. From the Reservoir, ditches, probably existing from earlier phases, were improved to carry increased flow along the valley edges and directed into desired areas.

That the valley was intensively transformed for the industrial-level of sugar cane cultivation is well documented. The many bridges, culverts, ditches, and sluice gates all speak to the incredible management, especially of water to the thirsty sugar cane, needed to produce such a crop. While the landscape contains such infrastructure, it was also destructive to the earlier archaeological record. Such massive landscape changes often results in the destruction of earlier sites, such as kuleana walls, mounds, enclosures, and other residential structures. Such is the tide of change. The importance of the Plantation era to the economics and lifestyle of the 19th and 20th centuries in Māhā'ulepū and the greater Kōloa region is vastly important to understanding the entire chronology and land use of the area.

The primary 20th century modification to the valley was the drilling of wells to feed the Māhā'ulepū Reservoir. Ditches discovered during the AIS led to and from the northern and southern ends of the reservoir, with pipelines extending to the ditch that paralleled the Māhā'ulepū stream course. Clearly, the reservoir was taking water out of the valley to other fields of the Kōloa area plantation. There is no evidence that these modifications were built on
the backs of historic or traditional irrigation systems. It must be kept in mind that the intensity of sugar cane cultivation operations erased a great deal of evidence of previous occupation.

Sugar cane cultivation required plowing operations that could reach depths of up to 1 meter below ground surface. Nearly one hundred years of these operations have scoured the Māhāʻulepū Valley floor. No cultural materials of any era were found during pedestrian survey of the valley floor. Areas identified on historic maps as having been wells and pumping stations, as well as LCA settlements had no materials or artifacts which could be attributed to the former occupants.

However, it has been borne out by the current research, in some areas, the deeper past is preserved, both within the fields and on their outer reaches. Site -3094 and Site -2250 remain intact and are thought to represent pre-Contact ceremonial pursuits. That Feature 1 of Site -3094 boulder was preserved, when all around it sugar cane was cultivated, speaks to its importance. Intensive transformation occurred in the valley, which is why Feature 2 of Site -3094 was such an interesting find: it occurred beneath the grasses, in the only location which mechanical stratigraphic test trenching showed not to have been impacted by sugar cane cultivation.

TRAILS

The Kaua‘i lead archaeologist (SHPD) and community emphasized the need to consider potential trails in the area, particularly those that would lead to the top of the ridgeline to the east. Given reports of Keolewa Heiau possibly located atop Mount Ha‘upu, and the former Hanakalauea Heiau within the valley (outside the current project area), this could suggest that pre-Contact/Historic era trails may have once connected the project area to the upper ridgeline. The ridgeline itself has also been considered as culturally significant by some. Despite ethnographic accounts of Keolewa Heiau, there are no direct observations of such a religious structure; and it may be that the crest of the mountain was regarded as holy but no structure was ever constructed and sanctified through ceremony to make it so. A limited field inspection by SCS crew to the summit in December 2015 did not discover any definitive structural elements typically associated with heiau construction.

Formal survey was conducted of the extended survey area, and informal survey was also conducted along the base of the valley's slopes and up toward the ridgeline to the north and east to ascertain the presence/absence of trails to the ridgeline. The crew hiked to just below the summit of the northern and eastern ridgelines, which proved to be inaccessible from this location. Although a modern trail can be observed in Google Earth imagery (2014) from the summit proceeding down the southern ridge, it is likely that the trail continues south along the eastern ridge of Māhāʻulepū Valley towards Puʻu Keke and does not connect to the project area.
An SCS crew field visit was completed on June 19, 2015 to the location where the word “Path” was marked on Registered Survey Map #1898. Given that the possible path shown in the survey map was marked slightly on the mauka side of a land division which still exists today, the map was georeferenced to existing TMK and physical landscape features and the path location was exported to a GPS for relocation in the field.

Upon arriving at the precise georeferenced location, it was apparent that the possible path was situated directly on the uphill side of a former historic period agricultural ditch. Both flume and lock components which functioned to control the flow of water into the field were visible in the vicinity of the possible path. On the uphill side of the ditch is a fence and on the uphill side of the fence, and following it, is a flattened area which served the maintenance of the fence. The flume, fence, and maintenance path continue northwest towards the former reservoir and southeast towards Pu'u Keke. Mauka (east) of the agricultural infrastructure the land becomes rapidly and increasingly steep and is crisscrossed with informal game trails and erosional gullies. No evidence was found that a path or any other cultural feature was located above the area where the agricultural infrastructure flanks the field.

Finally, SCS had the pleasure of sitting down and listening to Mr. James Case, born and raised in Kōloa and now 95 years of age. The extremely sharp Mr. Case presented a fascinating background of the Kōloa area, from his birth in 1920 through the plantation days and into the present. Of particular interest was a focus on his knowledge of trails in the area. Mr. Case, who was born on Grove Farm and grew up in Kōloa across the street from Wilcox Dairy, and had walked all over Kōloa and beyond as a child/teenager, and later, as a professional surveyor (prior to getting into law). He explored all the reaches of Māhā'ulepū Valley and even swam in the reservoir as a young boy.

Per trails in the Māhā'ulepū area, Mr. Case emphatically stated that he was unaware of any formal trails in or out of the valley. He reasoned that a) during the early days, it was easier to move by canoe on the ocean than by foot through the mountains; and b) all folks ascending the mountains would have used the Kōloa Gap, and not attempted to climb the ridges of Māhā'ulepū and beyond. He knew of many trails from Kipukai to Nawiliwili but none in Māhā'ulepū. He noted that, to his knowledge, there was no trail on top of the ridges around Māhā'ulepū as the east-west transition for all was indeed the Kōloa Gap.

Of additional interest, Mr. Case talked with SCS about land use through time and was not surprised that mainly historic sites were documented. He reasoned that sugar cultivation utilized a ratoon system for sugar cane cultivation, with deep excavation (to 4-5 feet below surface) and raising of furrows and mounds c. 6 feet apart across the surface. He noted that every 6 years the
land was plowed for new crops, inferring that after so many decades of doing this intrusive work, it was unlikely any traces of former activities would be present.

Overall, there was no empirical evidence on the ground for any trails connecting the project area or the extended survey area to the eastern or northern ridgelines, especially the former, which would be a direct route to Mount Ha'upu. Only sporadic pig trails were present. These animal trails lead to dead ends below steep cliffs and slopes. However, there are easier ways to gain the heights of the ridge, and traditional occupants may not have found it necessary to access the steep eastern and northern valley walls to gain access to the ridgelines above.

Older maps also do not show access routes up to the ridgeline (see above). It is worth noting that when a prior survey was conducted of the ridgeline itself, no trails were evident and archaeologists had to be dropped by helicopter and cleared their way through the survey area (McMahon 1996). The only sign of any possible trail was found in Registered Survey Map #1898 which noted the presence of a “Path.” This may simply have referred to a survey point on the ditch and not an actual trail.

Another line of evidence was that older generations may recall trails in the area. An interview with Mr. James Case, formerly born and raised in the area, substantiated that he had no knowledge of any trails or paths in the Māhā'ulepū area. Similarly, none of the other parties that were consulted in connection with the AIS provided any information about any trails (nor has any such information been discovered through the interviews conducted for the Cultural Impact Assessment).

In total, the findings of the AIS were as somewhat predicted, given the intensive land use during the 19th and 20th centuries in the project area. It was also interesting to note that the heiau was identified, and occurred in non-cleared areas above the project area flat lands. Plantation-era features dominate the current landscape, as expected, given the industrial nature of the cultivation and process. It is within this vein that the proposed project would move forward, also potentially utilizing the soils and infrastructure (ditches, etc.) created during this large-scale land alteration period.

**ASSESSMENT OF PROJECT EFFECT ON HISTORIC SITES**

In total, none of the 16 sites will be adversely affected by the proposed project, but safeguards will be in place. Those sites related to historic era sugar cane activities will not be adversely affected by the proposed project but may be adaptively re-used. These are presented in Table 2, as well as avoidance measures to minimize negative impacts to the sites.
SIGNIFICANCE ASSESSMENTS AND RECOMMENDATIONS

All sixteen (16) sites documented (and re-identified) during the current AIS have been evaluated for significance according to the criteria established for the State and National Register of Historic Places. The five criteria are listed below:

**Criterion A:** Site is associated with events that have made a significant contribution to the broad patterns of our history;

**Criterion B:** Site is associated with the lives of persons significant to our past;

**Criterion C:** Site is an excellent site type; embodies distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual construction;

**Criterion D:** Site has yielded or has the potential to yield information important in prehistory or history;

**Criterion E:** Site has cultural significance; probable religious structures or burials present (State of Hawai‘i criteria only).

Table 2 summarizes descriptive information on the sites, their significance, and recommendations. The sixteen historic properties have been assessed for significance and recommendations for mitigation. Two of the sixteen sites have been evaluated as significant under multiple criteria but occur outside the project area. Neither site will be adversely affected by the current proposed project. No further work is recommended for the rest of the sites as all relevant information has been drawn from these sites. Finally, as no anticipated project effects are postulated, no further mitigation is recommended for the project area.
Table 2. Site Descriptive Data, Significance, Recommendations, and Possible Adaptive Re-uses.

<table>
<thead>
<tr>
<th>SIHP 50-30-10-</th>
<th>Site Type</th>
<th>Function</th>
<th># Features</th>
<th>Age</th>
<th>Significance &amp; Recommendations</th>
<th>Adaptive Re-use</th>
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</thead>
<tbody>
<tr>
<td>2250</td>
<td>Enclosure</td>
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<td>D, E; *NFW</td>
<td>Out of Project Area</td>
</tr>
<tr>
<td>2251</td>
<td>Ditch, Gate</td>
<td>Irrigation</td>
<td>2</td>
<td>Historic</td>
<td>D; NFW</td>
<td>Out of Project Area</td>
</tr>
<tr>
<td>2252</td>
<td>Ditch, Gates</td>
<td>Irrigation</td>
<td>3</td>
<td>Historic</td>
<td>D; NFW</td>
<td>Out of Project Area</td>
</tr>
<tr>
<td>2253</td>
<td>Ditch</td>
<td>Irrigation</td>
<td>1</td>
<td>Historic</td>
<td>D; NFW</td>
<td>Out of Project Area</td>
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<td>2254</td>
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<td>Soil Retention</td>
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<td>D; NFW</td>
<td>Cows will be excluded from feature by fencing as it lies near waterway.</td>
</tr>
<tr>
<td>2255</td>
<td>Culvert Bridges</td>
<td>Irrigation</td>
<td>4</td>
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<td>Will be used to cross existing waterway.</td>
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<tr>
<td>SIHP 50-30-10-</td>
<td>Site Type</td>
<td>Function</td>
<td># Features</td>
<td>Age</td>
<td>Significance &amp; Recommendations</td>
<td>Adaptive Re-use</td>
</tr>
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<td>2263</td>
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<td>2264</td>
<td>Pipe/Foundation</td>
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<td>D; NFW</td>
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<td>Petroglyphs</td>
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<td>Pre-Contact</td>
<td>D, E; NFW</td>
<td>Out of Project Area</td>
</tr>
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</table>

*NFW = No Further Work.*
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Silva, Carol

Sommer, Anthony

ST-1 Trench

ST-1 PROFILE

I

II

III

UNEXCAVATED

0 30 60 90 120 cm

KEY

- LAYER I: DARK BROWN (10YR 3/4) SILTY CLAY
- LAYER II: DARK GRAYISH BROWN (10YR 4/2) CLAY
- LAYER III: DARK GRAYISH BROWN (10YR 4/2) CLAY
ST-2 Trench

ST-2 PROFILE

I

II

III

UNEXCAVATED

0 30 60 90 120 cm

KEY

I - LAYER I: DARK BROWN (10YR 3/4) SILTY CLAY
II - LAYER II: DARK GRAYISH BROWN (10YR 4/2) CLAY
III - LAYER III: DARK GRAYISH BROWN (10YR 4/2) CLAY
ST-3 Trench

ST-3 PROFILE

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<tr>
<td>III</td>
<td>LAYER III: DARK GRAYISH BROWN (10YR 4/2) CLAY</td>
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KEY
ST-4 Trench

ST-4 PROFILE

UNEXCAVATED

KEY

I - LAYER I: DARK BROWN (10YR 3/4) SILTY CLAY
II - LAYER II: DARK GRAYISH BROWN (10YR 4/2) CLAY
III - LAYER III: DARK GRAYISH BROWN (10YR 4/2) CLAY
ST-5 PROFILE

I

II

UNEXCAVATED

KEY

I - LAYER I: DARK BROWN (10YR 3/4) SILTY CLAY
II - LAYER II: DARK BROWN (10YR 3/3) CLAY

ST-6 PROFILE

I

II

III

IV

V

UNEXCAVATED

KEY

I - LAYER I: DARK BROWN (10YR 3/4) SILTY CLAY
II - LAYER II: DARK BROWN (10YR 4/2) CLAY
III - LAYER III: BROWN (10YR 4/3) CLAY
IV - LAYER IV: DARK GRAYISH BROWN (10YR 4/2) CLAY
V - LAYER V: BROWN (10YR 4/3) CLAY
ST-7 Trench West Wall

ST-7 PROFILE

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<tr>
<td>II</td>
<td>Yellow Brown (10YR 5/4) Clay</td>
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<tr>
<td>III</td>
<td>Black Clay</td>
</tr>
<tr>
<td>IV</td>
<td>Brown (10YR 4/3) Clay</td>
</tr>
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KEY
ST-9 PROFILE

KEY

I - LAYER I: DARK BROWN (10YR 4/3) SILT
II - LAYER II: YELLOWISH DARK BROWN (10YR 4/4) CLAY
ST-10 Trench

ST-10 PROFILE

---

I

II

UNEXCAVATED

---

KEY

I - LAYER I: DARK BROWN (10YR 4/3) SILT
II - LAYER II: YELLOWISH BROWN (10YR 5/8) SILT
ST-11 Overview with Site -3094

ST-11 PROFILE

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KEY

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<td>LAYER I: DARK BROWN (10YR 4/3) SILT</td>
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<td>II</td>
<td>LAYER II: YELLOWISH BROWN (10YR 5/8) SILT</td>
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ST-12 PROFILE

I

II

UNEXCAVATED

0 40 80 120 160 cm

KEY

I - LAYER I: DARK BROWN (10YR 4/3) SILT
II - LAYER II: YELLOWISH BROWN (10YR 5/8) SILT

ST-13 PROFILE

I

II

UNEXCAVATED

0 40 80 120 160 cm

KEY

I - LAYER I: DARK BROWN (10YR 4/3) SILT
II - LAYER II: YELLOWISH BROWN (10YR 5/8) SILT
ST-14 PROFILE

I

II

UNEXCAVATED

0 40 80 120 160 cm

KEY

I - LAYER I: DARK BROWN (10YR 4/3) SILTY CLAY
II - LAYER II: YELLOWISH BROWN (10YR 3/6) CLAY

ST-15 PROFILE

I

II

III

UNEXCAVATED

0 20 40 60 80 cm

KEY

I - LAYER I: DARK BROWN (10YR 4/3) SILTY CLAY
II - LAYER II: DARK GRAYISH BROWN (10YR 4/2) CLAY
III - LAYER III: DARK GRAYISH BROWN (10YR 4/2) CLAY
ST-16 Trench North Wall

ST-16 PROFILE

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<td>II</td>
<td>DARK GRAYISH BROWN (10YR 4/2) CLAY</td>
</tr>
<tr>
<td>III</td>
<td>DARK GRAYISH BROWN (10YR 4/2) CLAY</td>
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</table>
ST-17 Trench West Wall

### Key

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<td>I</td>
<td>Layer I: Dark Brown (10YR 4/3) Silty Clay</td>
</tr>
<tr>
<td>II</td>
<td>Layer II: Gray (10YR 5/2) Clay and Dark Brown (10YR 4/3) Clay</td>
</tr>
<tr>
<td>III</td>
<td>Layer III: Dark Yellowish Brown (10YR 4/6) Clay</td>
</tr>
<tr>
<td>IV</td>
<td>Layer IV: Dark Gray (10YR 4/2) Clay</td>
</tr>
</tbody>
</table>
APPENDIX H

CULTURAL IMPACT ASSESSMENT, MĀHĀ‘ULEPŪ AHUPUA‘A,
KŌLOA DISTRICT, KAUA‘I ISLAND, HAWAI‘I

SCIENTIFIC CONSULTANT SERVICES, INC.
CULTURAL IMPACT ASSESSMENT
MĀHĀ‘ULEPŪ AHUPUA‘A, KŌLOA DISTRICT,
KAUA‘I ISLAND, HAWAI‘I

TMK: (4) 2-9-001:001 por., (4) 2-9-003:001 por.,
and (4) 2-9-003:006 por.

Prepared by:
Michael F. Dega., Ph.D.
May 2016

Prepared for:
Hawai‘i Dairy Farms LLC
P.O. Box 1690
Kōloa, Kaua‘i, Hawai‘i 96765
# TABLE OF CONTENTS

INTRODUCTION ........................................................................................................... 4

METHODOLOGY ............................................................................................................ 8
  ARCHIVAL RESEARCH ................................................................................................. 9
  INTERVIEW METHODOLOGY ..................................................................................... 10
  HAWAII DAIRY FARMS PROJECT DESCRIPTION .................................................. 10
  LANDFORM, SOILS, AND VEGETATION .................................................................... 11

TRADITIONAL AND HISTORIC SETTING .................................................................... 13
  PRE-CONTACT ERA .................................................................................................... 13
  WAHI PANA (LEGENDARY PLACES) .......................................................................... 14
  EUROPEAN CONTACT AND THE KAMEHAMEHA DYNASTY ..................................... 16
  THE REGENCY OF KABBAHUMANU ........................................................................... 19
  LAND COMMISSION AWARDS .................................................................................. 20
  SUGAR AND THE HISTORIC ERA OF KŌLOA AND MĀHĀʻULEPŪ .............................. 27

PREVIOUS ARCHAEOLOGY ........................................................................................... 30

CONSULTATION ........................................................................................................... 37

CULTURAL IMPACT ASSESSMENT INTERVIEWS AND CONCERNS .............................. 38
  RUPERT ROWE .......................................................................................................... 38
  KALANIKUMAI .......................................................................................................... 40
  REVEREND DOCTOR ALAN AKANA .......................................................................... 43
  LLEWELYN “BILLY” KAOHELAULIʻI .......................................................................... 44
  TERRIE HAYES .......................................................................................................... 45
  BRIDGET HAMMERQUIST ......................................................................................... 46
  TEDDY BLAKE ........................................................................................................... 49
  CATHERINE AND KARL LO ..................................................................................... 51
  JAMES (JIM) H. CASE ............................................................................................... 51

SUMMARY ..................................................................................................................... 54

CULTURAL ASSESSMENT .............................................................................................. 55

CONCLUSION ................................................................................................................ 56
REFERENCES...............................................................................................................................56
APPENDIX A: EXAMPLE LETTER OF INQUIRY ...................................................................................... A
APPENDIX B: NEWSPAPER NOTICE AND AFFIDAVIT........................................................................... B
APPENDIX C: EXAMPLE FOLLOW-UP LETTER ......................................................................................... C
APPENDIX D: SIGNED INFORMATION RELEASE FORM ........................................................................ D
APPENDIX E: CATHERINE AND KARL LO’S CONCERNS ................................................................... E

LIST OF FIGURES

FIGURE 1: USGS QUADRANGLE (LIHUE 1996; 1:24,000) MAP SHOWING PROJECT AREA LOCATION......... 5
FIGURE 2: TAX MAP KEY [TMK: (4) 2-9-003] MAP SHOWING PROJECT AREA LOCATION. ....................... 6
FIGURE 4: REGISTERED SURVEY MAP #1898 SHOWING LOCATION OF “HOUSE”, “CATTLE PEN”, AND LCAS IN MID-VALLEY. NOTE: “PATH” IN MAP CENTER ........................................................................................................................................ 24
FIGURE 5: REGISTERED SURVEY MAP #1900 (1897) OF LCAS IN MĀHĀ’ULEPŪ VALLEY. .................... 25
FIGURE 6: MODERN TMK MAP OF MĀHĀ’ULEPŪ VALLEY DEPICTING LCAS ........................................... 26
FIGURE 7: KOLOA PLANTATION INFRASTRUCTURE ................................................................................. 31
FIGURE 8: DISTRIBUTION OF KOLOA PLANTATION LANDS (1935). .......................................................... 33
FIGURE 9: PREVIOUS ARCHAEOLOGICAL STUDIES IN THE MĀHĀ’ULEPŪ AREA .................................... 35
INTRODUCTION

At the request of Hawaii Dairy Farms LLC, Scientific Consultant Services, Inc. prepared a Cultural Impact Assessment (CIA) of a 557-acre property in advance of proposed improvements for a proposed dairy farm property located within Māhāʻulepū Valley, Māhāʻulepū Ahupuaʻa, Kōloa District, Island of Kauaʻi. The property is owned by Mahaulepu Farms LLC and comprises TMK: (4) 2-9-003-001 por. & 006 por. and (4) 2-9-001:001 por. (Figures 1 and 2).

The Constitution of the State of Hawaiʻi clearly states the duty of the State and its agencies is to preserve, protect, and prevent interference with the traditional and customary rights of Native Hawaiians. Article XII, Section 7 (2000) requires the State to “protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupuaʻa tenants who are descendants of Native Hawaiians who inhabited the Hawaiian Islands prior to 1778.” In spite of the establishment of the foreign concept of private ownership and western-style government, Kamehameha III (Kauikeaouli) preserved the peoples traditional right to subsistence. As a result in 1850, the Hawaiian Government confirmed the traditional access rights to Native Hawaiian ahupuaʻa tenants to gather specific natural resources for customary uses from undeveloped private property and waterways under the Hawaiian Revised Statutes (HRS) 7-1. In 1992, the State of Hawaiʻi Supreme Court, reaffirmed HRS 7-1 and expanded it to include, “native Hawaiian rights…may extend beyond the ahupuaʻa in which a Native Hawaiian resides where such rights have been customarily and traditionally exercised in this manner” (Pele Defense Fund v. Paty, 73 Haw.578, 1992).

Act 50, enacted by the Legislature of the State of Hawaiʻi (2000) with House Bill (HB) 2895, relating to Environmental Impact Statements, proposes that:

…there is a need to clarify that the preparation of environmental assessments or environmental impact statements should identify and address effects on Hawaiʻi’s culture, and traditional and customary rights… [H.B. NO. 2895].

Articles IX and XII of the State constitution, other state laws, and the courts of the State impose on government agencies a duty to promote and protect cultural beliefs and practices, and resources of Native Hawaiians as well as other ethnic groups. Act 50 also requires state agencies and other developers to assess the effects of proposed land use or shoreline developments on the “cultural practices of the community and State” as part of the HRS Chapter 343 (2001) environmental review process.
Figure 1: USGS Quadrangle (Lihue 1996; 1:24,000) Map Showing Project Area Location.
Figure 2: Tax Map Key [TMK: (4) 2-9-003] Map Showing Project Area Location.
It also redefined the definition of “significant effect” to include “...the sum of effects on the quality of the environment, including actions that irrevocably commit a natural resource, curtail the range of beneficial uses of the environment, are contrary to the State's environmental policies . . . or adversely affect the economic welfare, social welfare or cultural practices of the community and State” (H.B. 2895, Act 50, 2000). Cultural resources can include a broad range of often overlapping categories, including places, behaviors, values, beliefs, objects, records, stories, etc. (H.B. 2895, Act 50, 2000).

Thus, Act 50 requires that an assessment of cultural practices and the possible impacts of a proposed action be included in Environmental Assessments and Environmental Impact Statements, and to be taken into consideration during the planning process. As defined by the Hawaii State Office of Environmental Quality Control (OEQC), the concept of geographical expansion is recognized by using, as an example, “the broad geographical area, e.g. district or ahupua’a” (OEQC 2012:12). It was decided that the process should identify 'anthropological' cultural practices, rather than 'social' cultural practices. For example, limu (edible seaweed) gathering would be considered an anthropological cultural practice, while a modern-day marathon would be considered a social cultural practice.

Therefore, the purpose of a CIA is to identify the possibility of ongoing cultural activities and resources within a project area, or its vicinity, and then assessing the potential for impacts on these cultural resources. The CIA is not intended to be a document of in-depth archival-historical land research, or a record of oral family histories, unless these records contain information about specific cultural resources that might be impacted by a proposed project.

According to the Guidelines for Assessing Cultural Impacts established by the Hawaii State Office of Environmental Quality Control (OEQC 2012:12):

The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religions and spiritual customs. The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both manmade and natural, which support such cultural beliefs.

The meaning of “traditional” was explained in National Register Bulletin:

"Traditional” in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice. The traditional cultural significance of a historic property then is significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices. . . . [Parker and King 1990:1]
This CIA was prepared as much as possible in accordance with the suggested methodology and content protocol in the Guidelines for Assessing Cultural Impacts (OEQC 2012:11-13). In outlining the “Cultural Impact Assessment Methodology,” the OEQC (2012:11) states that:

…information may be obtained through scoping, community meetings, ethnographic interviews and oral histories…

This report contains archival and documentary research, as well as communication with organizations having knowledge of the project area, its cultural resources, and its practices and beliefs. An example of the letters of inquiry is presented in Appendix A. Copies of the posted newspaper notice and the affidavit are presented in Appendix B. An example of the follow-up letter of inquiry is presented in Appendix C. The signed information release form is presented in Appendix D. This CIA was prepared in accordance with the suggested methodology and content protocol provided in the Guidelines for Assessing Cultural Impacts (OEQC 2012:13), whenever possible. The assessment concerning cultural impacts may include, but not be limited to:

A. Discussion of the methods applied and results of consultation with individuals and organizations identified by the preparer as being familiar with cultural practices and features associated with the project area, including any constraints or limitations which might have affected the quality of the information obtained.

B. Description of methods adopted by the preparer to identify, locate, and select the persons interviewed, including a discussion of the level of effort undertaken.

C. Ethnographic and oral history interview procedures, including the circumstances under which the interviews were conducted, and any constraints or limitations which might have affected the quality of the information obtained.

D. Biographical information concerning the individuals and organizations consulted their particular expertise and their historical and genealogical relationship to the project area, as well as information concerning the persons submitting information or interviewed their particular knowledge and cultural expertise, if any, and their historical and genealogical relationship to the project area.

E. Discussion concerning historical and cultural source materials consulted, the institutions and repositories searched and the level of effort undertaken. This discussion should include, if appropriate, the particular perspective of the
authors, any opposing views, and any other relevant constraints, limitations or biases.

F. Discussion concerning the cultural resources, practices and beliefs identified, and, for resources and practices, their location within the broad geographical area in which the proposed action is located, as well as their direct or indirect significance or connection to the project site.

G. Discussion concerning the nature of the cultural practices and beliefs, and the significance of the cultural resources within the project area affected directly or indirectly by the proposed project.

H. Explanation of confidential information that has been withheld from public disclosure in the assessment.

I. Discussion concerning any conflicting information in regard to identified cultural resources, practices and beliefs.

J. Analysis of the potential effect of any proposed physical alteration on cultural resources, practices or beliefs; the potential of the proposed action to isolate cultural resources, practices or beliefs from their setting; and the potential of the proposed action to introduce elements which may alter the setting in which cultural practices take place.

K. A bibliography of references, and attached records of interviews which were allowed to be disclosed.

If ongoing cultural activities and/or resources are identified within the project area, assessments of the potential effects on the cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

ARCHIVAL RESEARCH

Archival research focused on a historical documentary study involving both published and unpublished sources. These sources included legendary accounts of native and early foreign writers; early historical journals and narratives; historic maps; land records, such as Land Commission Awards, Royal Patent Grants, and Boundary Commission records; historic accounts; and previous archaeological reports.
INTERVIEW METHODOLOGY

Interviews are conducted in accordance with Federal and State laws and guidelines when knowledgeable individuals are able to identify cultural practices in, or in close proximity to, the project area. If they have knowledge of traditional stories, practices and beliefs associated with a project area or if they know of historical properties within the project area, they are sought out for additional consultation and interviews. Individuals who have particular knowledge of traditions passed down from preceding generations and a personal familiarity with the project area are invited to share their relevant information concerning particular cultural resources. Often people are recommended for their expertise, and indeed, organizations, such as Hawaiian Civic Clubs, the Island Branch of Office of Hawaiian Affairs (OHA), historical societies, Island Trail clubs, and Planning Commissions are depended upon for their recommendations of suitable informants. These groups are invited to contribute their input and suggest further avenues of inquiry, as well as specific individuals to interview. It should be stressed again that this process does not include formal or in-depth ethnographic interviews or oral histories as described in the OEQC's Guidelines for Assessing Cultural Impacts (2012). The assessments are intended to identify potential impacts to ongoing cultural practices, or resources, within a project area or in its close vicinity.

If knowledgeable individuals are identified, personal interviews are sometimes taped and then transcribed. These draft transcripts are returned to each of the participants for their review and comments. After corrections are made, each individual signs a release form, making the interview available for this study. When telephone interviews occur, a summary of the information is usually sent for correction and approval, or dictated by the informant and then incorporated into the document. If no cultural resource information is forthcoming and no knowledgeable informants are suggested for further inquiry, interviews are not conducted.

HAWAII DAIRY FARMS PROJECT DESCRIPTION¹

Hawai‘i Dairy Farms, LLC (HDF) was formed as a positive step toward the island state’s food security, economic diversity, and sustainability. Experimental trials were conducted to determine lands capable of growing nutritious forage for dairy cows, and lands meeting the operational requirements for a dairy operation were identified. Kaua‘i was determined to best meet the operational requirements, and Māhā‘ulepū Valley was found to provide ideal growing conditions.

At steady-state production with 699 milking cows, the farm will produce roughly 1.2 million gallons annually at market price. HDF will reduce

¹ Text for this section provided by Group 70 International.
Hawaii's reliance on imported milk from the mainland United States by increasing current fresh local milk production by approximately 33 percent. The farm will be based on the most successful island dairy models in the world, and will utilize a sustainable, pasture-based rotational-grazing system and 21st century technology. The farm will be very different from conventional feedlot dairy operations.

HDF is committed to establishing a herd of up to 699 mature dairy cows, and demonstrating the pasture-based system as an economically and environmentally sustainable model for Hawaii. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. The application process for a National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) permit includes public notification and input. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is currently estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

**LANDFORM, SOILS, AND VEGETATION**

The mountain range that flanks the surveyed area to the north and northeast are composed of the most ancient volcanic series in the high islands, the Waimea Canyon Basalts (NPS 2008:11). These formed during the shield-building stage of the Kaua'i volcano, as eruptions gradually built up its sides and widened its base. Most of the range is part of the ancient Napali member of the Waimea series, dating from 4.35 to 5.1 million years ago. The caldera of Mount Ha'upu is a separate geological feature from the rest of the range and remains undated (Blay and Siemens 2004).

Māhā'ulepū lands below Ha'upu ridge are part of the Kōloa series that cloaks most of the eastern half of Kaua'i. The series formed as the Kaua'i volcano ceased major eruption and began to erode, with occasional small eruptions at lava domes, cinder cones, and spatter cones. These produced a layer of lava that, though not large in mass, nevertheless covered a large area. Kōloa volcanics within the study area at Māhā'ulepū include both underlying lava and visible vents, ranging from 0.5 to 2.0 million years in age (Blay and Siemens 2004).

Portions of the valley's slopes have been identified as Rockland (rRK; Foote et al. 1972: Sheet 32). This is composed of areas where exposed rock covers 25 to 90 percent of the surface.
Rock outcrops and very shallow soils are the main characteristics. The rock outcrops are mainly basalt and andesite. Elevations range from near sea level to more than 6,000 feet, with annual rainfall amounts between 15 to 60 inches. The vegetation at lower elevations consists mainly of *kiawe*, *klu*, *piligrass*, Japanese tea and *koa haole*.

Soils on the slopes of the valley are also associated with the KEHF series or Kalapa very rocky silty clay (Foote *et al.* 1972: Sheet 32). This is a well-drained soil that occurs at the base of slopes and is associated with moderately sloping to very steep topography. Elevations range from 200 to 1,200 feet above sea level, with annual rainfall amounts between 60 to 100 inches. Associated vegetation consists of guava, *lantana*, sensitive plant, *pilipiliula*, *ohia*, Japanese tea, and ferns.

Soils within the valley have been classified as LPE or Lualualei Series, composed of extremely stoney clay (Foote *et al.* 1972: Sheet 32). This series consists of well-drained soils on the coastal plains, alluvial fans, and on talus slopes. They are nearly level and gently sloping. Elevations range from 10 to 125 feet above sea level, with annual rainfall amounts to 50 inches per year. There is a prolonged dry spell during the summer. These soils are associated with sugarcane, truck crops, pasture, wildlife habitat, urban development, and military installations on Kaua’i. Associated vegetation consists of *kiawe*, *koa haole*, bristly foxtail, *uhaloa*, and fingergrass. This soil type, extremely stoney clay, was identified in several trenches during the AIS, with most stratigraphic trenches excavated on the valley floor being composed of a shallow O-horizon overlaying brown/yellow clays. In other words, there are exceptions to the general soil survey.

Twelve different soils within Māhā’ulepū Valley are identified on a USGS/USDA Soil Map kindly provided to the field crew by HDF (NRCS 2014). The soils map depicts the various soil regimes across the valley floor; these soil differences are most likely a product of water, whether through transport, ground water, or run-off deposition. During pedestrian survey of areas with sparse or no ground vegetation, the transition of soils was visibly recognizable.

The project area has been utilized for commercial sugar cane cultivation and/or livestock pasturage since the middle of the 19th century and is fairly clear of vegetation. Most of the project area lies fallow with the soils exposed. Some of the areas are covered with grasses up to 0.3 m tall, and smaller areas at the northeast and northwest ends of the valley are 100% covered by grasses up to 2.0 m tall. Within the surveyed area are few scattered *koa haole* and java plum trees. These occur outside the main valley footprint/project area, which has been extensively cleared for well over a hundred years. The slopes of the valley outside the project area are forested.
TRADITIONAL AND HISTORIC SETTING

Early settlement and agricultural development is thought to have first occurred on the windward sides of the Hawaiian Islands, including Kaua‘i, sometime in the A.D. 900-1000 range during what is known as the Colonization Period (Kirch 2011:22). Most likely arriving from east Polynesia, these early inhabitants brought with them a variety of tools, fishing gear, and household goods. Dogs, pigs and chickens were brought by these Polynesian voyagers for food. The Polynesian rat also arrived with the voyagers, but whether these were intentionally transported as a food source is unclear. Considering that every food crop cultivated by the Polynesians arrived with them, it is evident that these people had considerable knowledge not only regarding how to plant and harvest these crops, but also how to transport the crops' seeds, cuttings, and roots.

Prior to European Contact in 1778, Hawaiians cultivated taro in both irrigated and dry fields. Other dryland agriculture crops included ‘uala (sweet potato), uhi (yams), maia (bananas), ipu (gourds), and ko (sugar cane). Grasses were utilized for thatching the roofs of structures and covering floors, which were then covered by hala (pandanus) mats. Hala was also used in the making of matting and sails. Important arboreal crops included niu (coconut) and ulu (breadfruit). Other trees were utilized for the construction of canoes, house frames, tools, and weapons. Kapa cloth from wauke (paper mulberry) was also tended. There were a variety of medicinal plants utilized and plants, such as olona, grown to provide fibers for making cordage (Handy and Handy 1972).

Hawaiian aquaculture was extensive, and included the construction and maintenance of coastal and riverine fish ponds. Fishing ranged from shoreline to pelagic, with different strategies for each. In order to maintain and benefit from all of these resource zones, Hawaiian polities were organized into ahupua‘a, which gave residents access to a wide array of resources extending from mountain top forests to deep sea fishing zones. An ahupua‘a was an ancient land division that ran from the ocean to the mountains and allowed those living there to proffer from all the different environmental zones of the land. Ahupua‘a boundaries could expand, contract, appear, and disappear, depending upon political events. Given the size of Māhā‘ulepū Valley, Māhā‘ulepū Ahupua‘a was highly valued.

PRE-CONTACT ERA

Initial Polynesian settlement of Kaua‘i occurred in the resource-rich regions surrounding Wailua River on the east coast; the equally verdant Waimea River region on the southern coast; and the Hanalei region on the north coast (Joesting 1984). As with all the Hawaiian Islands, each district and region was eventually settled. These settlements developed into polities which allied,
warred, and co-existed with one another until Kaua'i came under unified rule of a single king. This process occurred in different stages on different islands. Because of the relative distance of Kaua'i from O'ahu, Moloka'i, Maui, Lana'i, and Hawai'i Island, the polities of Kaua'i and her neighbor Ni'ihau became their own entity, while the other islands struggled first for internal control and later, for the conquest and rule of several, and ultimately all, the islands.

The primary residence of the high king was in the Wailua River region of Kaua'i, with miles of cultivated lands, mountain resources, religious sites, and shoreline to pelagic fishing. Broad stretches of beach allowed for canoe landings but there was no deep water anchorage, despite the presence of the Wailua River.

Initial settlement is presumed near the coastline in the A.D. 1000-1200 range, with expansion inland during the A.D. 1400-1600s, as was typical across the islands (see Kirch 1985). Agricultural field systems were created at these inland areas, closer to fresh water resources and soil more amenable to kalo and sweet potato production. Permanent habitation locales were present from the coast to this more inland area, with ceremonial sites, walls, and other associated structures being built. Within the mountainous areas, such as at the back of Māhā'ulepū Valley, temporary habitation loci such as rock shelters/caves or small enclosures (C-shapes) were utilized by those gathering upland resources. The middle zone, between the coastlines and mountains, such as Māhā'ulepū, was ideal for agriculture and homesteads, as witnessed by the numerous LCA's occurring in a small section of the valley later. However, historic land use obliterated much of the archaeological signatures for these settlements.

In early 1778 Captain James Cook and the two ships under his command, H.M.S. Resolution and H.M.S. Discovery arrived off of Kaua'i. Finding that they could not make landfall at Wailua, Cook continued westward until reaching Waimea. This would be the beginning of contact between Europeans and Hawaiians (Salmond 2003).

WAHI PANA (LEGENDARY PLACES)

Māhā'ulepū literally translates as “and falling together” (Pukui et al. 1974:138), a likely reference to the ridges flanking the sizable valley. Handy and Handy (1972:427) describe Māhā'ulepū as a

Broad, rich valley with a broad bottom, not planted with sugar cane but no doubt it was once had some lo'i. The area is in the lee of the …Waialeale mountain. Some inferior taro was grown in mounds (pu'epu'e) in semibrackish spring water in the lower valley.

According to Wichman (1998:47-48), the name “Māhā'ulepū” refers to a great battle that occurred in Māhā'ulepū in the 1300s. Kalaunuiohua, an ali'i from the island of Hawai'i, was
attempting to conquer all of the Hawaiian Islands. He had already succeeded in gaining control over the islands of Maui, Moloka'i, and O'ahu and was carrying the ruling ali'i from those islands with him as prisoners when he set sail for Kaua'i. Kūkona, the ruling ali'i of Kaua'i at that time, was aware of the coming invasion and placed his warriors in the mountain ridges above and his canoes in Hanapēpē Bay where they could not be seen. Wichman (1998:47-48) describes the battle as follows:

[Kūkona] allowed Kalaunuiohua to land unopposed and soon the Hawai'i canoes were drawn up on the beach, the royal prisoners safely housed, and all the invading warriors formed into their fighting order. Then Kūkona, dressed in full royal regalia of helmet and cloak and with his Kāhili towering above him, appeared on the ridge above. Kalaunuiohua hurried to meet his enemy, but when he arrived, no chief was there. Then, a shout was heard, and Kalaunuiohua saw Kūkona on the neighboring ridge. From ridge to ridge, Kūkona drew his invaders farther and farther from the beach, until they reached the plains of Wahiawa. Here Kūkona ordered his army to attack, and the invading army, stretched thinly over so many miles, was easily defeated.

Meanwhile, Kūkona's canoe fleet sped from Hanapēpē and caught the invading canoes before they even had time to launch them again. In the fierce battle between canoes, blood flowed freely. Only one enemy canoe managed to escape to bring the dreadful news back to their home island. By nightfall, Kalaunuiohua's was gone and he was a prisoner. The other royal prisoner's had been found, and Kūkona found himself in the position of being able to take command of all the islands. While he decided what to do, he took his captured chiefs on an extended tour of the island.

Subsequently, significant landmarks in the area were named after events from this battle. The ridge beneath which the invading canoes met their demise became known as “Kawelikoa” (terror of the warriors), the cape where the invading army beached their canoes and came ashore is now known as “Nā‘ākea” (starboard hulls of the double canoe), and the bay is known today as “Papamō‘i (platform of the king) in reference to the ruling ali‘i who encountered each other there.

Māhā‘ulepū Ahupua'a sits in the shadow of Mount Hā'upu (to recollect), a 2,297 foot peak within the Wai'ale'ale Mountain Range. Mount Hā'upu is associated with numerous legends and chants. According to Pukui et al. (1974:187) Mount Hā'upu was possibly named after a demigod. According to legend, there is a legendary stone at located at Ka'ena Point, O'ahu, that was thrown by an ali'i from Kaua'i named Hā'upu (Westervelt in Sterling and Summers1978:93-94). Hā'upu was a great warrior capable of great feats of strength. However, when he was angered he often acted rashly. One night while he was sleeping on the side of a mountain facing O'ahu, he was awakened by shouting. As he looked towards O'ahu he could see numerous lights
out on the water. As he had just awakened from a deep sleep, Hā'upu was not thinking clearing and thought a great fleet of enemy warriors was coming to attack Kaua'i. So, in an effort to defeat the enemy, Hā'upu tore loose a huge boulder and hurled it at the lights and voices killing, many members of a fishing party from O'ahu. The rock thrown by Hā'upu became embedded in the ocean, but as it was so large, the upper portion rose far out of the water. Later, when the demo-god Māui attempted to unite the islands of O'ahu and Kaua'i together, “sea goddesses snagged his hook on this rock.”

Oral traditions reflect the beauty and the prominent role of Mount Hā'upu. The following Hawaiian proverbs, collected, translated, and interpreted by Mary Kawena Pukui (1983) refer to Mount Hā'upu:

Hā'upu mauna Kilohana i ka la'i.
Hā'upu, a mountain outstanding in the calm.

Said of a person of outstanding achievement. Also used in praise of Hā'upu, Kaua'i (Pukui 1983:59).

Ka'i ka pua'a i luna o Hā'upu e au ana.
When the pigs move around the summit of Hā'upu, it is going to rain.

When puffy “pig” clouds encircle the top of Hā'upu, above Kīpū, on Kaua'i, it is a sign of rain (Pukui 1983:151).

Ka'ohu wānana ua o Hā'upu.
The mist of Hā'upu that foretells rain.

When clouds circle the peak of Hā'upu. Kaua'i, it is sure to rain.

**EUROPEAN CONTACT AND THE KAMEHAMEHA DYNASTY**

The third voyage commanded by Captain Cook was undertaken primarily to discover the fabled Northwest Passage, which supposedly linked the Pacific, Arctic, and Atlantic Oceans. As he had during previous journeys, Cook visited Tahiti and it was from there that he set out for the northern Pacific coast of North America.

The voyage put him within sight of the island of O'ahu, but adverse winds prevented his arrival. Continuing on to Kaua'i, he sighted Wailua, but could not make landfall. The ships continued southwest and then westward, past Mount Ha'upu and Māhā'ulepū Valley. Both were sketched and drawn by expedition artist John Webber, the first European artwork to depict a Hawaiian Island.
Cook found a manageable anchorage at the mouth of Waimea River. Several trips ashore by him and a select group of his officers, marines, and crew led to generally good relations with the Hawaiians. It is unclear what Cook and the others learned about the politics of Kaua'i and her eastern neighbor. It is probable that at this time (1778) Kaeokulani was ruler of Kaua'i. He was of high rank, a chief born on Maui, and the half-brother of the paramount king of Maui, Kahekili.

After a short time on Kaua'i in the early months of 1778, Cook departed to continue the search for the Northwest Passage. A year passed after which Cook returned to the Hawaiian Islands. This time, Maui was sited and briefly visited, but the island of Hawai'i became the focus of the remainder of the voyage of Cook and ultimately of his demise, at Kealakekua Bay (Salmond 2003).

After the death of Cook, the journey continued, now under the command of Captain Clerke. The ship passed O'ahu, and returned to Waimea, Kaua'i. After their departure a short time later, it would not be until 1786 that Europeans returned to the Hawaiian Islands, with Waimea (Kaua'i) receiving her share of British and American vessels focusing on the lucrative fur trade in the Pacific Northwest. These visits coincided with, and perhaps accelerated, the growing conflict for control of the eastern islands.

Beginning in approximately 1790, battles on and around Maui, Moloka'i, and Hawai'i Island between several rulers occurred with increasing ferocity. Safely in control of Kaua'i, Kaeokulani became a participant, bringing fleets of warriors to assist his half-brother on Maui. Many European and American ship captains had contact with all the rivals, and a fairly coherent chronology of events is known. What certainly is known is that Kaeokulani was killed during a battle in Honolulu in 1794 while fighting his nephew Kalanikupule, who had taken rule of Maui and O'ahu upon the death of his father Kahekili in Waikiki, several years earlier in 1791 (Ridley 2010).

The son of Kaeokulani was Kaumuali'i. Born around 1780, the young king went through a period where a Regent (an older relative) made the decisions, but Kaumuali'i eventually came to rule on his own. The remainder of his days was spent trying to keep Kamehameha, who had consolidated the rule of the other islands, from bringing Kaua'i in as well.

Kamehameha had difficulty solidifying his rule. Rebellions, plague, and appeasing subordinates all kept him from mounting more than two serious efforts at physical conquest of Kaua'i. The first effort to fail occurred in 1796 when Kamehameha sailed with an invasion fleet for Kaua'i. Hit by a heavy storm, the fleet turned back to O'ahu (Kamakau 1961). The second effort failed in 1804 when Kamehameha mustered his forces on O'ahu, but the army fell victim to *oku'u*, a smallpox epidemic. Kamehameha himself almost died, and far too many of his troops,
counselors, and their families did succumb (Kamakau 1961). In 1810 Kamehameha used diplomacy, suggesting that he rule the eastern islands in name and deed, while Kaumuali'i acknowledge his suzerainty but continue to rule Kaua'i and Ni'ihau. It was agreed that the arrangement would end with the death of Kaumuali'i and that rule would then pass to the heirs of Kamehameha. It was an arrangement that Kamehameha and Kaumuali'i would honor, but that the heirs of Kamehameha would not (Joesting 1984).

This arrangement lasted between 1810 and 1822. It endured the death of Kamehameha the Great in 1819. During these 12 years, Kaumuali'i solidified rule of his kingdom and engaged in efforts to gain foreign weapons and support from the Russian Fur Company (Mills 2002). Also during this time, the trade in sandalwood flourished. Harvested in the Hawaiian Islands, traded for goods to European and American captains, and sold in the Chinese trade ports of Macao and Canton, sandalwood became the first Hawaiian cash crop (Ridley 2010). The Hawaiians called it laau ala (sweet wood) or iliahi (fiery surface) for its reddish blooms. They used this wood for scenting bark cloth, making dyes, and for medicinal purposes (Ridley 2010).

At first, the sandalwood revenue went solely to the paramount chiefs, Kamehameha and Kaumuali'i. However, with the death of Kamehameha, nearly all of his chiefs called upon the young heir, Liholiho, and the Regents, among whom was Ka'ahumanu, the favorite wife of Kamehameha but not mother of his heirs, to allow the chiefs to harvest sandalwood for their own profit. This practice would affect and disrupt the rule of Hawai'i and the welfare of the common people for decades.

The upland forests were scoured, crops were neglected, commoners suffered malnutrition and disease, chiefs went into debt to foreigners, and Liholiho was hard pressed to find new resources for his chiefs to exploit. Kaua'i appeared to be the answer. While continuing to honor the arrangement made by his father, Liholiho arrived on Kaua'i in 1822, visited with Kaumuali'i, and then kidnapped him, returning to O'ahu with his captive. In order to secure the rule of Kaua'i, Kaumuali'i was forced to marry not an heir of Kamehameha, but his wife, Ka'ahumanu. To ensure her hold, she also wed her new husband's son, Keali'iiahonui. This second marriage was later dissolved. However, ties between dynasties stayed strong as Keali'iiahonui married a granddaughter of Kamehameha, named Kekauōnohi (Mills 2002).

Ka'ahumanu had been instrumental in the overthrow of the kapu system of Hawaiian governance and social behavior, as well as one of the earliest and most prominent proponents of conversion to Christianity. That she utilized polyandry to achieve control of Kaua'i is just one example of her abilities to utilize both traditional and introduced ways of life to achieve her goals (Joesting 1984).
While still titular ruler, Kaumuali‘i did not exercise any power. Governors were appointed by the Regents, the first of these being the brother of Ka‘ahumanu, named Kahekili Ke‘eaumoku. Beginning with this Governor, land acquisitions beneficial not just to the Kamehameha line but to their powerful subordinates started.

The practice of allowing individual chiefs to harvest sandalwood was carried over to Kaua‘i. How many Kaua‘i chiefs retained their lands during this time is not certain. What was certain is that the mountains of Kaua‘i, including Ha‘upu, yielded the valuable resource. And practically the only place that it could be shipped was from the only secure anchorage at Waimea River. Waimea also served as a provisioning port of call to the growing number of whaling ships that began to appear in the Pacific.

The independent rule of Kaua‘i came to an end in 1824 with the death of Kaumuali‘i. This same year, the heir of Kamehameha, Liholiho Kamehameha II also died. The kingdom of Hawai‘i would now be ruled by a queen.

THE REGENCY OF KA‘BAHUMANU

Ka‘ahumanu was one of Kamehameha's primary wives, his favorite in fact, but not of sufficient rank to be mother of his heirs. It appears she never bore the king, or anyone else, any children. From her actions following his death in 1819, it is apparent that Ka'ahumanu considered herself Kamehameha's heir. The mother of the heirs, Keopuolani, died in 1823. Her first son was Liholiho, born in 1796, made king in 1819, and died visiting London in 1824. Her second son was Kauikeaouli Kamehameha III, born in 1813. Her daughter, Nahienaena was born in 1815 (Day 1984). With the death of Liholiho and his mother, Ka'ahumanu became Regent of the kingdom until Kauikeaouli would come of age. Her rule of Hawai‘i in general, and Kaua‘i specifically, was adroit, intelligent, and shrewd.

George Kaumuali‘i and a number of Kaua‘i chiefs forcefully resisted the rule of the Kamehameha line, and their revolt was crushed. As with many Byzantine events in Hawaiian history, some Kaua‘i chiefs stood with the old, while others stood with the new. In this case, as with any other, people chose who they thought would benefit them most. Those who rebelled had their lands and lives taken, while those who did not, benefitted.

The first long term governor during the regency was Kaikioewa, a high chief born at Waimea, Kaua‘i. He was a first cousin and brother-in-law of Kamehameha, a guardian of Kamehameha III, and a principal leader in crushing the 1824 rebellion (Mills 2002). He reigned as governor from 1825 until his death in 1839. During his tenure, we know of at least one konohiki, or land manager, for Māhā‘ulepū. Documents show that in 1826, Hukiku was konohiki. He was in attendance that year during a visit by the governor. Kaikioewa was accompanied by
missionary Samuel Whitney of Waimea, who left an account of this event. It is unknown if Hukiku was Kaua'i born, or one of the conquerors invested with this stewardship. He may be the chief Kukiku, who Kaikioewa named commander of Paulaula o Hipo, also known as “The Russian Fort” (Mills 2002).

During his term as governor, Kaikioewa claimed Ha'upu Ridge, to the east/northeast of Māhāʻulepū, as his personal sandalwood reserve. One of the duties Hukiko performed may have been overseeing the efforts to harvest sandalwood from the ridge and transport it to foreign ships at Waimea or Kōloa. Eventually, as did so many other aliʻi, the governor would go into debt to foreign captains and merchants. When the sandalwood ran out, it is not clear how Kaikioewa paid his bills (Joesting 1984).

Kaʻahumanu ruled as Regent until her death in 1831. A daughter of Kamehameha, Kīnaʻu, took over as Regent until 1834, at which time Kauikeaouli Kamehameha III took the throne. He had lived on Kaua'i as a boy under the protection of Kaikioewa but had spent the majority of his youth on Oʻahu. Ruling until his own early death in 1854, his reign was admirable for its civil rights, efficiency, and the creation of the Great Māhele, by which land awards to commoners and granting ownership to the disenfranchised was achieved. In Māhāʻulepū, there were many Land Commission Awards (LCA), discussed below, but the majority of the acreage was retained by the government. During his reign, there was an increase in the number of immigrants from Europe, the United States, and China. Missionaries, merchants, laborers, and farmers of multiple nationalities added to the diversity and complexity of the Kingdom.

LAND COMMISSION AWARDS

The Great Māhele was yet another drastic change in the lives of Hawaiians. Commoners, also known as makaʻainana, had for centuries been allowed use, but denied ownership of the lands they worked. This changed in the late 1840s when private ownership of lands was made into law. Certainly aliʻi, or nobles, had the better of the deal, but commoners were allowed to claim, through right of labor and longevity of occupancy, Land Commission Awards (LCA). King Kauikeaouli Kamehameha III was a sovereign brought up in the old ways who saw that some things must change, and orchestrated this new policy. A legal process was established, in which land claimants testified, and had others support their testimony, before a Commission appointed by the king. Traditional land use was communal and land use was often dendritic, following the course of streams and occupation zones from the coast to the mountains. Claimants were often related and the lands they claimed were as varied in their usage as they were in their location. For a traditional ahupua'a to work, those mauka (towards the mountains) had to work with those makai (towards the ocean). The private ownership offered through the Māhele,
however, created new risks for landowners. A commoner who did not own the land could not go into debt; but, one who did could achieve profit or debt.

Land claim testimonials are complex documents. Boundaries are defined in a variety of ways. Land divisions descend in size from *ahupua'a* to *kuleana* to *'ili*, thence *apana*, and finally *mala*, which are individual garden plots, fields, and/or *lo'i* (Pukui 1957). Other boundaries are defined by names of neighboring occupants or by use of the land. Testimonies were given regarding which chief had granted the occupant use of the land. This is compelling, because occupants claimed title based on grants from Kaumuali'i, last independent king of Kaua'i, to Kaikioewa, governor from 1824 to 1839 for the Kamehameha Dynasty, to his *konohiki* for Māhā'ulepū, Hukiki. They invoked the names of Ka'ahumanu, the Regent for nearly a decade, to Kīna'u, Regent and half-sister to King Kauikeaouli Kamehameha III until he took the throne. Some claims were contested, others were not, and some were won on appeal. When one studies the LCAs of Māhā'ulepū, it can be seen that claims of land, in a variety of places, for a variety of uses, were made by individuals throughout the *ahupua'a*. With modern ownership, a traditional lifestyle could be maintained, but once individual plots began to be sold, and relationships were sundered, life for the commoners and nobles alike began to change drastically.

On Kaua'i, and in Māhā'ulepū Valley specifically, a number of land claims were made by residents who had been allowed use of the land during the reign of the previous king. In the valley, LCA 5080 to Kiko, LCA 4767 to Napaliala, and LCA 4769 to Nahuma, for example, were all claimants who had tenure from Kaumuali'i. It is presumed that their neighbors had similar histories (Ching 1974). That these residents all received their awards is notable because their claims were based on the right of use granted by the former ruler, and not by permission of the Kamehameha Dynasty. An 1896 map of the valley, depicts a “house” and “cattle pen” in the northern part of the valley and the LCA's just below, in what today is the mid-section of the valley (Figure 3). The 1896 map also shows the word “Path”, far above the LCA area. This “path” was fully investigated during the AIS (2016) and shown not to exist (see below). An 1897 survey map by Monsarrat (Figure 4) shows a better view of the LCAs.

Many of LCAs for Māhā'ulepū are tightly clustered within the 'ili of Kawaiola (Figure 5). There is a cluster east of Māhā'ulepū Ditch near the center of the valley. The remainder of the valley was deemed government land. Thus, no LCAs occur elsewhere in the project area or the extended survey area. It is interesting to note the estimated population of this portion of Māhā'ulepū Valley at this time. In 1848, 46 male names appear in genealogical records (M. Ching, LDS Records). If one were to reasonably add one wife and at least one child per household, the population would have been 138 persons. In 1855, a total of 36 male names occur in the Māhā'ulepū records. Using the same figures, the total would have been 108 persons. This
represents a fairly sizeable population for this upper valley at that time, all likely associated with the LCAs.

The following provides a representative sample of names and LCAs that are both present on the LCA map within the project area and are described in previous literature (Ching 1974). Claimants used owners of adjacent lands as boundary references and/or supporters of their claims. Many claimants were related in some way. The claimants of LCAs within the project area often also had additional claims downstream of Māhā'ulepū Ditch on the coast or elsewhere. Thus, only some of the claims discussed (kula lands, etc.) may actually be in the project area. A good example is LCA 5080, where a salt pan is discussed. Such claims related to salt pans would have occurred far outside the current project area near the coastline. In addition, some of the claims also include information about other LCAs claimed by the same person. While somewhat confusing, the summary of records are presented in full here in order to get a clearer picture of the LCAs in and around the surveyed area:

**LCA 4767** Napaliala received his lands in the days of Kaumuali'i, who died in 1824. This was waste land when Napaliala took it over, occupied it, and developed it. He died in the late 1840s and his wife then possessed the land.

**LCA 4769** Nahuma was another native who occupied lands prior to 1824. One piece was waste land when he took it over, built on it, and fenced it with stone. In addition he received on the death of relatives other lands occupied previous to 1824: two (2) lo'i in the 'Ili of Kauki'i, which had belonged to his wife through her parents; 7 dry taro patches in Kioea received through his father-in-law, kula land at Waipa which his brother had taken possession of, planted orange trees and cultivated; and two salt ponds. Nahuma appears to have been an affluent native.

**LCA 4910** Kahee claimed property in the 'Ili of Kapakalehu; this property in the late 1840s had one orange tree. The konohiki contested the title of this property, claiming that Governess Kekaonohi had given it, and two more, to him and that he had cared for them, harvesting the fruit. Kahee never collected the oranges but contends that the governess had no right to give the trees to the konohiki as they had belonged to Kahee's parents, who had planted them and he was the rightful heir. That was the foundation of his claim.

**LCA 5080** Kiko took over waste land, built his own fences and dug his own salt pond in the 'Ili of Kawaiola (Note: the salt pond would be outside the project area, near the coastline). The date of occupancy is not given but it probably was later than Kaumuali'i, for Kiko's lo'i came from Kīna'u's time. Kīna'u was a daughter of Kamehameha, mother of the kings Kamehameha IV and V, and was Regent between the death of Ka'ahumanu and the ascendency of Kamehameha III, her half-brother.

Ching (1974) argues the recovery of waste land mentioned in LCA records was the clearing of previously untouched lands for cultivation. However, Putzi (2014) argues that these
were previously cultivated areas left unattended due to a declining native population, but were brought back into production because of the incentive of individual ownership. It may be that ownership, as well as the threat of feral cattle and pigs, led to the construction of fences of either stone or wooden posts to delineate property boundaries. Other claimants shown on the LCA map were identified in the Mahele Database:

**LCA 4770** Naahuao. The land came to Naahuao through his father, who was granted the land by Hukiku, the konohiki of Māhā'ulepū during the reign of Governor Kaikioewa. He gives his testimony as follows:

Greetings to the Land Commissioners: Be it known to you, the ones who quiet land titles, that I, Naahuao, a man living at Māhā'ulepū, island of Kaua'i have a claim for land, and the kula. The genuine land is 56 fathoms long by 26 fathoms wide. The mala of noni is 26 fathoms long by 13 fathoms wide. The salt land is 6 fathoms long by 4 fathoms wide. Another salt land is 10 fathoms long by 7 fathoms wide. A house lot is 28 fathoms on the long sides and 25 fathoms on the wide side. My message is ended. A respectful farewell to you, Naahuao.

**LCA 6667** Mika received lands from Ahukai (owner of LCA 4543) on the LCA map, but no further information has been gained. Mika received lands from Kaikioewa in the days of Kinau. His testimony reads:

The Land Commissioners, greetings: I, Mika, a Hawaiian subject living in Māhā'ulepū, hereby state my claim for 4 lo'i, 5 sweet potato enclosures, 4 mala of noni, and 3 orange trees. However, these claims are not situated together, but are in various cultivated places of Māhā'ulepū, also 1 mala of uhī/yam/ a kula planting of wauke and one other lo'i. 1 loko/ either fish pond or taro pond/ and 13 lo'i are bounded 80 fathoms on the east, 80 fathoms on the south, 20 fathoms on the west and 10 fathoms on the north. That is my claim which was received from Ahukai. There is also a kula named Hoopouliloa. Respectfully, Mika.

The testimony of Mika says much about how Hawaiians utilized the Māhā'ulepū landscape and environs. Parcels were utilized for the cultivation of several food crops, for raising fish, and the growth of wauke for the production of kapa cloth. Except for the orange trees, this is a classic example of traditional Hawaiian life. The mention of sweet potato enclosures is interesting because 'uala were traditionally raised in long rows of intermittent mounds. It may be that these fields were fenced in to protect them from pigs or cattle, or that land ownership required definitive boundaries.

It is worthy to note that all the LCAs in the Māhā'ulepū project area are confined to a central area, on the east side of Māhā'ulepū Stream, with the remainder of the valley claimed as government lands. These LCAs form a tight cluster. Of additional interest is that during the
height of the sandalwood trade the adjacent Ha'upu Ridge was claimed by Kaikioewa. It would appear that after his death in 1839 these mountain claims would revert to government control.

The Governor of Kaua'i in 1842 was Kekauonohi, the granddaughter of Kamehameha who had wed Keli'ialohi after having been a wife to her uncle Liholiho Kamehameha II. During her governorship, Kekauonohi partook in land exchanges, consolidating her grants in Māhā'ulepū and Kōloa. These consolidated lands would become the basis for the next cash crop – sugar, which, unlike sandalwood, could be rejuvenated and continued. From the 1830s until the 1980s, sugar would be the economic focus of Māhā'ulepū. Remnants of industrial-level sugar cane cultivation in the area represent the greatest number of historic properties documented during the current AIS.

Figure 3: Registered Survey Map #1898 showing location of “House”, “Cattle Pen”, and LCAs in mid-valley. Note: “Path” in map center.
Figure 4: Registered Survey Map #1900 (1897) of LCAs in Māhā'ulepū Valley.
Figure 5: Modern TMK map of Māhā'ulepū Valley depicting LCAs.
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**SUGAR AND THE HISTORIC ERA OF KŌLOA AND MĀHĀ'ULEPŪ**

The sugar cane history of Māhā'ulepū is intricately tied with the history of Kōloa. Sugar cane began to be grown and milled commercially in Māhā'ulepū Valley and around Kōloa in the 1820s, one of the first places in Hawai'i where sugar was commercially grown (Donohugh 2001). Some of the earliest efforts were undertaken by Chinese immigrants (post 1820s-30s) who had a small mill in Māhā'ulepū, as well as in Kōloa and other parts of the island. The mills were small, producing raw sugar and molasses for local consumption. By 1835, however, many of these farmers were out of business and were later employed by new plantation owners.

In 1835, a sugar cane plantation owned by Ladd and Company was located to the west of the surveyed area. This was the first attempt at producing sugar cane at an industrial scale. The land was leased for a fifty year period from Kaua'i Governor Kaikioewa and King Kamehameha III. Importantly, the lease was the first of its kind in Hawai'i and represented the first formal recognition that someone other than a chief could control land use. Kōloa Plantation, formally established in 1841, is universally known to be the first commercial sugar plantation in the
islands. Ladd and Company was the first owner of the plantation but financial difficulties caused them to sell in 1845. Robert Wood and his brother-in-law bought the plantation and kept the plantation going until 1899 when the Koloa Agricultural Company, the McBryde family, bought the plantation. The Koloa Plantation merged with Grove Farm in 1948 and continued operations through 1996.

The sugar industry grew sporadically between 1845 and 1875. At this latter date, the Hawaiian government scored a coup of its own when a reciprocity treaty with the United States was negotiated. This allowed all unrefined Hawaiian sugar to be admitted into the United States duty free. The cultivation of sugar was going to become profitable (Alexander 1985:74).

Koloa Plantation commenced growing sugar cane in Māhāʻulepū Valley in 1878, having focused more on lands to the west near Kōloa. A total of 875 acres of the flat valley floor was made available. The land was level, sheltered, and had a good underground water supply. However, there was an initial problem with the ground water as some of the valley was saturated and other areas were dry. Accordingly, Koloa Plantation undertook efforts to build infrastructure that would drain waters from the saturated areas, and divert that water to irrigate drier fields (Alexander 1985). Sugar cane requires much water so in 1897, the Koloa Plantation also excavated several wells to irrigate the cane in Māhāʻulepū Valley (see Donohugh 2001).

By 1897, the main source of irrigation water for the valley came from the ground water. At the northwest end of the valley, six wells were drilled and the water was pumped approximately a quarter mile to the north into the recently constructed Māhāʻulepū Reservoir (Figure 6). The area of the wells was known as “Māhāʻulepū 14”, probably because that was the number of wells eventually drilled and/or in service. The primary source of irrigation water for Māhāʻulepū appears to have been the six wells drilled in 1897. Four more were drilled later and all were located near the western side of the valley. These wells pumped water to Māhāʻulepū Reservoir, where it was stored and released, when needed, to various parts of the valley via the irrigation ditch.

Irrigation ditches at both the north and south ends of the Māhāʻulepū Reservoir served to transport water to the crops and to receive water from existing streams descending from Haʻupu Ridge (Alexander 1985:97-98). A pumping station was built and manned with full-time resident staff who lived with their families in a camp here. The larger north to south, excavated irrigation ditch that extends the length of the valley was excavated but does not appear on the 1935 Koloa Plantation map (Figure 7). Intensification of irrigation efforts, which added to the waters provided by Māhāʻulepū Ditch, began after this date.
The thick clay soils of the Valley were difficult to till using plows pulled by teams of oxen. However, with the introduction of steam powered tractors, more land began to be put into production. Development thus began to escalate at the start of the 20th Century. The number of laborers increased from 430 in December, 1900 to 769 in July, 1901. In February, 1904 it was reported that 600 out of 730 men were “working on permanent improvements.” (Ibid.) Infrastructure modifications in Māhā’ulepū Valley also intensified at the start of the 20th Century, with the excavation of canals, reservoirs, and wells. A narrow gauge railway was also constructed in the valley. The railway extended from Koloa Mill to “Māhā’ulepū 14”, the series of wells on the valley floor at the northwestern end of the valley itself. The railway tracks were movable, but SCS found no evidence of them in the valley during the current AIS. Other portable narrow gauge rail systems were utilized to facilitate the harvest.

In 1904, $16,420.81 was spent on additions to the plantation railroad system, including “a three-mile addition to the Puuhi railroad and a short cut road to Maha'ulepu” (Ibid.). Considering a laborer in the fields made about $17 per month, this was quite an expenditure at the time (Alexander 1985:122).

While the Plantation owned all the land, they contracted with groups of approximately a dozen men to manage parcels of fifty to one hundred acres. Koloa Plantation “…furnish[ed] land, seed-cane, water, fertilizer, and tools, and perform[ed] such portions of the work as require[d] expensive machinery, such as plowing, furrowing and hauling the cane to the mill” (Ibid, 97-98). The contractors, however, otherwise took care of their parcels from planting to harvest, selling the cane to the Plantation at a set price. This method kept the land under one owner, but provided the contractors incentive to raise a bountiful crop (Ibid. 123).

Early 20th century maps document the extent of the fields throughout the Kōloa and the Māhā’ulepū Valley areas. The fact that Māhā’ulepū Valley was used for extensive sugar cane cultivation is also evidenced by the infrastructure developed within the valley over time. Thus, the available information demonstrates that HDF's project area consists of lands that were previously used for sugar cultivation.
Grove Farm continued to produce sugar cane in the greater Kōloa area, including Māhā'ulepū, until 1974, when it leased its Kōloa lands and mill to McBryde Sugar Company (Donohugh 2001). Sugar production continued under McBryde until September, 1996 when the mill officially closed.

The Wilcox Family sold Grove Farm to S. Case in 2000. From the early cultivation times until then, the lands extending from Māhā'ulepū Valley to the sea were extensively modified for the cultivation of sugar. Fields were plowed, streambeds cleared, irrigation ditches excavated, reservoirs created, roads built, and wells drilled.

During the remainder of the Kingdom, then the Republic, through the Territorial Period, and into Statehood, sugar cultivation and Māhā'ulepū would be synonymous. More recently, since sugar cane cultivation operations ceased, Māhā'ulepū Valley has been the location of cattle ranching (2002) and taro cultivation (2007), the latter being done through lease to W.T. Hara.

**PREVIOUS ARCHAEOLOGY**

There have been numerous archaeological studies along the coast of Māhā'ulepū, but archaeological studies within Māhā'ulepū Valley and nearby inland environs have been limited. Figure 8 shows the location of relevant studies both within the current project area and close to the project area. The reader is also referred to a National Park Service (NPS; 2008) regional study for a praxis of the projects conducted along the coastline. A sampling of other studies that are further removed from the Māhā'ulepū project area are also briefly described below to provide additional context on a regional scale. Studies performed in areas closer to the ocean include those conducted by Farley (1898), Thrum (1907), Bennett (1931), Kikuchi (1963, 1980, 1981, 1988-d), Ching et al. (1974), Neller (1981), Rosendahl (1988, 1989), Hammatt (1979, 1989a, b, 1990 a, b) Pietrusewsky (1990), Walker and Rosendahl (1991) and Firor and Rosendahl (1994). Four projects were conducted directly with the current project area: Thrum (1907), Kikuchi (1963), Ching et al. (1979), and NPS (2008). The studies described below are listed in chronological order, not by geographic location, and provide both a regional and local context to previous archaeological work in the Māhā'ulepū area.

The earliest study was by F.K. Farley in 1898. During this study, petroglyphs were discovered beneath sand dunes at Keoneloa Beach, to the southeast of the current project area near the Hyatt hotel. According to Farley, local residents knew of the petroglyphs and reported that they had been exposed previously.
Figure 6: Koloa Plantation infrastructure (1912 USGS Territory of Hawai‘i Quadrangle portion).
The antiquarian T.G. Thrum documented two heiau on Kauai'i named Weliweli and Waiopili (Thrum 1907). The former was not accurately plotted on any map, while the latter was located along the stream of the same name that descends from Māhā'ulepū Valley. Waiopili Heiau was formerly just south of the current project area, near the present-day quarry.

Within the valley itself, but outside of the project area, Thrum identified the possible location of a large heiau named Hanakalaua. This heiau was reported to have been dismantled in the 1860s by a gentleman named Fredenberg and the stones then used to build cattle pens (Thrum 1907). Thrum also reports a fourth heiau, named Keolewa, on the crest of Mount Ha'upu (Thrum 1907; see also Bennett 1931, Site 90). It is not certain if Thrum or Bennett actually visited the site, but both noted that it was a small heiau dedicated to a goddess named Laka (Thrum 1907; Bennett 1931). A cursory field inspection of the summit by SCS archaeologists in December 2015 did not note any definitive structural remnants of this heiau.

During an archaeological survey conducted in 1928-1929, Bennett (1931) located or re-located the heiau at Weliweli and Waiopili. The Keoneloa Beach petroglyphs were not exposed during this visit but he collected information about them from local residents. Bennett also recorded human burials within the sand dunes at Makahuene Point.

According to Bennett (1931:46), at Waiopili Heiau, “a tower of stone stands in one corner. It is solid enough to climb upon and an excellent view is afforded from the top. It is a unique feature for Kauai heiau, and if modern, defies conjecture as to the reason of its construction.” According to Ching (1974), “Waiopili Heiau is a rectangular walled enclosure, which lies on a smooth pahoehoe lava bed. The limestone cliff which forms a natural boundary between Māhā'ulepū and Pa'a lies almost directly to the south of this temple.” Chang (1974) further states that Kapunekea Pond is nearby and that the walls were large, 2.5 m wide and 2.0 m high, constructed of pahoehoe slabs. The heiau was still mostly visible in 1974. By 2006, only a very small portion of the southern wall of the heiau was visible, near a spring pump house. The heiau has been mostly destroyed by quarrying activities, as well as by the quarry road which runs along the southern boundary of the former structure.

Kikuchi (1963) conducted an archaeological investigation of coastal Kōloa. In addition to identifying new sites near the coast, he re-located several sites described by Farley, Thrum, and Bennett: Site 96 (Kane'aukai Heiau); Site 97 (dune burials); Site 98 (Keoneloa Beach Petroglyph Field); Site 99 (Weliweli Heiau); Site 100 (Keoneloa Beach Walls); Site 101 (Makaweki Point petroglyphs); and Site 102 (a structure).
Figure 7: Distribution of Koloa Plantation lands (1935).
Kikuchi also documented the only previously identified site within the surveyed area, Site -3094. This site is composed of a large boulder sitting in a pasture at the northern end of the valley. Kikuchi (1963) notes this boulder as occurring some 2 miles inland. Some twenty anthropomorphic figures, two pecked cups (4 inches deep), and a long groove are etched on the surface (Ching et al. 1974; McMahon 2007; see also Cox and Stasack 1970). The groove may represent a stream, but interpretation is uncertain. As discussed below, this site was fully recorded and mapped during the current project. In addition to the one boulder previously identified by Kikuchi (1963), two additional petroglyph rocks associated with this site were also documented during the current AIS (see Results section below). Thus, Site -3094 now consists of three features.

During surface survey of 1,100 acres along the coastal lands of Weliweli, Paa, and Māhā'ulepū Ahupua'a, Ching et al. (1974) wrote of Weliweli Heiau: “no actual alignments or other features were noted at the reported location of this temple. This site has either been completely destroyed or is located elsewhere” (Ching et al. 1974:81). During the Ching study, the archaeologists found and sketched the petroglyphs at Keoneloa (Site 84), found sand dune burials (Sites 3096, 3097 and 3024) and re-located Waiopili Heiau (Site 87). They also located Waiopili Pond and Kapunakea Spring, but these were not given site designations (Firor and Rosendahl 1994).

Kikuchi (1984) continued archaeological investigations along the coastline of Keoneloa Beach. Kikuchi documented numerous sites and at least one, but possibly two, cultural layers that extended along the length of Keoneloa Bay (Kikuchi 1998a). This was the beginning of an era of extensive archaeological excavations and monitored construction excavations in this area. Work by Neller (1981), Rosendahl (1988, 1989), Hammatt (1979, 1989a, b, 1990 a, b) Pietrusewsky (1990), Walker and Rosendahl (1991) and Firor and Rosendahl (1994) followed.

McMahon (1996) conducted an archaeological field inspection of a circa 25,000 sq. ft. area on the southeast flank of Ha'upu ridge for the proposed installation of a radio tower. The project area for that study was located at 1,500 ft. asl. No sites were identified, nor were any trails observed along the ridgeline; the area was, as McMahon notes (1996), only accessible by helicopter.
Figure 8: Previous archaeological studies in the Māhā'ulepū area.
Following this study by McMahon (1996), a letter was submitted by the Office of Hawaiian Affairs (OHA) in March 1998 to the Federal Communications Commission opposing the construction of a radio tower on Mount Ha'upu. The letter stated that the mountain is of special significance to Native Hawaiians as a wahi kapu (sacred place): “Ha'upu is our kin, descendent of Papa [Earth mother] and Wakea [Sky father], and older sibling of the Hawaiian people. This is the main reason why we, as Hawaiians, hold Ha'upu sacred in our hearts”.

According to the OHA (1998) document, Ha'upu was named after a demi-god/warrior who took a large boulder from Kaua'i and threw it across the Ka'ie'ie Waho Channel, where it killed an enemy chief on O'ahu. The small heiau atop Mount Hā'upu is dedicated to the goddess of hula (Laka). Both the heiau and the wooded areas at Hā'upu Summitt are known as keolewa, a word common in Hawaiian oral traditions. In addition, Ku and Hina, the first Hawaiian god and goddess, live on Ha'upu Ridge. Mount Ha'upu was also an important navigational landmark for traditional Native Hawaiian fishermen, and Hawaiians today still view the mountain with reverence (OHA 1998).

Beginning in the 1990s, Burney and Kikuchi began excavating the Makauwahi Cave and Sinkhole. They stated that within the cave “in a single stratigraphic sequence and encapsulated view of the full span of human occupation, including the millennia preceding human arrival, earliest human evidence, subsequent population increased and cultural change, European contact, and modern transformation” (Burney and Kikuchi 2006). Amongst the many discoveries from this study are bones of a Polynesian rat, which dated to 1039-1241 A.D. Because the rats were in the canoes with Polynesian voyagers, this is some of the earliest evidence for human occupation of this area. Excavations also exposed intact cultural layers, as well as culturally sterile deposits. Artifacts such as files, picks, scrapers, adzes, fish hooks, octopus lures, game stones, sling stones, and hammer stones were recovered. The preservative qualities of the deposits in the sinkhole were excellent. Fiber cordage, wooden fragments from canoes, paddles, and tool handles were also recovered. These materials came from three excavations. There is much potential for more information to be gained from this site (Burney and Kikuchi 2006).

Archaeological surveys and field work were conducted farther to the southwest along Waikomo Ditch by Cultural Surveys, Hawaii, Inc. (Hammatt, et. al. 2004). The terrain this ditch flows through is different from the terrain that the stream which flows out of Māhā'ulepū Valley travels through. Features originating during the pre-Contact era include agricultural terraces, habitation terraces and platforms, and irrigation auwai along both crests and bases of long, low ridges were observed (Hammatt, et. al. 2004). This complex of sites is designated the Kōloa Field System.
The most recent comprehensive effort at documenting the biology, botany, geology, ecology, and archaeology of the region is that compiled by the National Park Service (NPS; 2008). “The Māhā'ulepū, Island of Kaua'i Reconnaissance Survey” published in 2008 consists of an effort by the NPS to re-identify multiple natural and cultural features in the Māhā'ulepū Valley and environs. The goal was to argue for the importance of conducting a more thorough natural and cultural study of the area along the southeast coast of Kaua'i from Kōloa to Poipū, and northward along Māhā'ulepū, Kīpū Kai, Niumalu, Nawilili Harbor and then to Līhu'e. Included in the study is Mount Ha'upu and the ridgelines extending from it (NPS 2008). The study presents a summary of the natural and cultural features for the area and effectively argues for additional research.

**CONSULTATION**

Consultation was conducted via telephone, e-mail, personal interviews, and the U.S. Postal Service. Consultation was sought from Dr. Kamana'opono M. Crabbe, Chief Executive Officer, Office of Hawaiian Affairs; Vincent H. Rodrigues, Cultural Historian, State Historic Preservation Division; Missy Kamai, Na Kuleana o Kanaka Oiwi; Teddy Blake, Kōloa Community Association; Randy Wichman, President Kaua'i Historical Society; Jane Kamahaoakalani Gray, Director of the Kaua'i Museum; Office of Hawaiian Affairs, Kaua'i Branch; Sherri “Puni” Patrick, kupuna; Rupert Rowe, community member, and proficient fisherman; Beryl Blaich, Executive Director of Malama Maha'ulepu; Bridget Hammerquist, Friends of Maha'ulepu; Kalanikumai (aka Branch Harmony), traditional cultural practitioner and member of Malama Maha'ulepu; Terrie Hayes, community member; Llewelyn “Billy” Kaohelaui'i, community member; Ali'i Nui Aleka Aipolani, Polynesian Kingdom of Atooi; Gordon Higa, community member; David Chang, long-time resident, founder of Ohana o Maha'ulepu, and founder of Malama Maha'ulepu; Napua Wong Romo, Vice-President Malama Maha'ulepu; Kunane Aipoalani; Leinaala Pavao Jardin, Kumu Hula; Aletha "Puna" Kaohi; Scott Sagum, Vice President of the Royal Order and President of the Ho'ola Lahui Hawaii Board of Directors; David Burney, steward of Makauwahi Cave; Lida Burney, steward of Makauwahi Cave; Catherine Lo, community member; Karl Lo, community member, Reverend Doctor Alan Akana, community member, and Reverend of Kōloa Union Church; Kaulilani Kahalekai, community member and cultural practitioner; William Ho'ohuli, community member; and Jim Case, longtime resident.

In addition, a Cultural Impact Assessment Notice was published on October 24, 25, and 28, 2012, in *The Honolulu Star-Advertiser* and in *The Maui News*, which published on the same dates on Maui, and the January 2015 issue of the OHA newspaper, *Ka Wai Ola* (see Appendix B). These notices requested information of cultural resources or activities in the area of the
proposed project, stated the Tax Map Key (TMK) number, and where to respond with pertinent information. Based on the responses, an assessment of the potential effects on cultural resources in the project area and recommendations for mitigation of these effects can be proposed.

**CULTURAL IMPACT ASSESSMENT INTERVIEWS AND CONCERNS**

Analysis of the potential effect of the project on cultural resources, practices or beliefs, the potential to isolate cultural resources, maintain practices or beliefs in their original setting, and the potential of the project to introduce elements that may alter the setting in which cultural practices take place is a requirement of the OEQC (2012:13). As stated earlier, this includes the cultural resources of the different groups comprising the multiethnic community of Hawai‘i.

Initially, Mr. Kawika McKeague, Group 70 Cultural Liaison, planned to sit in on the interviews. However, due to health reasons, Mr. McKeague was unable to attend either session. Due to a family emergency, Missy Kamai was unable to attend either interview session. David Chang planned on attending the April 17, 2015 interview session, but called Friday morning to say he was not feeling well. Scott Sagan, also, planned on attending, but health issues prevented kept him away, as well.

Consultation was conducted in person on April 16 by SCS Senior Archaeologists Ms. Dagher and Jim Powell, B.A. These semi-private interviews were hosted by Mr. and Mrs. Hammerquist and with the permission of those in attendance; the interviews were conducted on the Hammerquist's lanai. Those interviewed on April 16, 2015 included:

- Rupert Rowe
- Kalanikumai
- Reverend Doctor Alan Akana
- Llewelyn “Billy” Kaohelauli‘i
- Terrie Hayes
- Kaulani Kahalekai
- Bridget Hammerquist

**RUPERT ROWE**

Rupert Rowe explained that this area has three springs set up to feed taro patches so that water is filtered on its journey to the ocean. Big land owners, in Hawai‘i, are able to colonize the islands because there is no treaty between the Kingdom and the United States. As wards of the State, which is based on a liquid measurement, Native Hawaiians really do not have the
resources to fight the corporations that occupy Hawai'i. When asked by one of the interviewers if he knew the names of the springs, Mr. Rowe answered that he could not reveal their names because a lot of the secrets about the culture are being invaded by people who try to do what they want to do. There is no place in the world where the culture is second best to the citizens of America. By becoming wards of the United States, Native Hawaiians are totally dysfunctional under the puppet government of the State of Hawai'i because as the host culture, they can never protect their assets of the past, the future, and the present. Archaeologists and consultants conducting research try to document the mystical part of Hawaiian culture, but it can't be understood by outsiders “it's like talking bubbles under water.”

As a kanaka maoli, Mr. Rowe can only speak of the culture and its unique situation as it applies to this [Māhā'ulepū] valley. Native Hawaiians are the only people in Hawai'i who do not have a say in what happens. Everyone else is just interested in making money, but what they are really doing is stealing the treasury of the Kingdom of Hawai'i. You cannot buy land in Hawai'i and come out with a valid deed. In order to own the land out right, you have to have clear title to the land, which is a treaty between two states. When the time came for Hawai'i to become a part of the United States, the native people didn't want to become American because they saw it as a country without a culture (i.e., as a country without a race). They saw the moral values of the Americans as based on the face of the dollar that says “In God we trust.” The people wondered what does god have to do with a piece of paper? Native people understand that energy is within a person and when you talk of a spiritual bond between native cultures and the land, it is understood that all people have a great bond between the land and their souls (i.e., they intuitively understand the uniqueness of what is there).

When asked by one of the interviewers if he was from the Maha'ulepu area, Mr. Rowe responded that his 'ohana where from Māhā'ulepū and Kōloa. Mr. Rowe added that, as had said earlier, the outside people want to know the genealogies of the people from a particular area, but culturally, the ranking ali'i did not disclose their identity to their enemies. Kalanikumai interjected that Rupert's family, in Kōloa and, Māhā'ulepū goes back many, many, many generation before western contact and that Rupert's family name appears on the roles and on the records. Mr. Rowe believes that letting his cultural and familial secrets out to the westerner world is a violation of his human and civil rights.

Concerns

Mr. Rowe is concerned that the proposed dairy will disturb the bond between the soul and land. He strongly believes that it's important for native people to have a voice in what happens to the land. Mr. Rowe's opinion is that the native person really loses out when the western mentality of taking “what is yours to be theirs.”
KALANIKUMAI

Kalanikumai Ka Mak'ul'uli 'O Na Ali'i Hanohano: Representing the 7th generation of aboriginal descendants of Kōloa District since Western contact, Kalanikumai stated that his Mo'okuauhau [genealogy] goes back many generations before western contact. Kalanikumai knows of two of the springs in the area. One spring is currently owned by the County and there used to be a habitation site built there located above the road. Title to this Spring site is clouded as the County contacted and obtained a signature from one member of the Kekauoha family [Vice-Principal at Hanalei School 1940's post-war], while seven other brothers and sisters held equal claim unsettled. (source: Samuel Kekauoha/ family Elder & Genealogist).

Another spring is located in Hidden Valley (also known as 'Aweoweonui). Kalanikumai's great-great-great grandfather (Nakapa'ahu, [1798-1895] son of Nahinu, a grand-nephew of Kaumuali'i, and first-cousin to the Kamehameha regime, who was principal Ali'i Nui of Kōloa prior to the overthrow, and later the superintendent (Ilāmuku) of Kōloa under the Kingdom, built and occupied a Kauhale by the Spring through the auspices of Hannah Moore, who had adopted Nakapa'ahu's daughter and encouraged Nakapa'ahu to live on the property and work the land. Nakapa'ahu developed the Hidden Valley spring, on land given to him by Mika who had acquired the land through a trade. Mika was tax collector for the Kingdom, and first Lay Teacher at the Catholic “San Rafael” Parish School operated by the Belgian “Sacred Heart” Order. Mika's mother, Hannah Moore, negotiated the transfer of land from Mika to Nakapa'ahu, as documented in the records. Mika married Nakapa'ahu's daughter Rose. Trained by her husband, Rose became the second Lay Teacher at San Rafael's. Rose, in turn, trained her elder sister Halieta's daughter [Rebecca] as the third, and final Lay Teacher at that school. The two families were closely intertwined.

Nakapa'ahu built up the spring, established a home there, with cultivated lo'i, garden, and raised his daughter there for the last twenty-six years of his life. He fostered a relationship with a haole named William Brown, who organized the kalo farmers in the Māhā'ulepū Valley, who were at odds with Koloa Sugar over the kalo lands. There was a case where Mr. Brown got Koloa Sugar to pay a settlement to him (Nakapa'ahu), which he distributed among the tenant kalo farmers, for violations and intrusions that Koloa Sugar had been doing on the kalo lands. Two years after Nakapa'ahu died, in 1897, Knudsen Estate and Koloa Sugar tried to claim the land. Mr. Brown helped Nakapa'ahu's daughter, got legal counsel, organized a defense against Knudsen Estate and Koloa Sugar. Knudsen Estate and Koloa Sugar tried to exclude Brown from representing Nakapa'ahu's daughter, as he was no relation to her. So, William Brown married Nakapa'ahu's daughter, in order to be able to speak for her. In 1899, the Kauai District Court ruled that the land belonged to Nakapa'ahu's heirs fee simple, under the right of Adverse
Possession. In 1991, Kalanikumai discovered documentation indicating Grove Farm had acquired quiet title to the land in 1976. Kalanikumai states he has direct Kuleana claim to land at 'Aweoweonui and that Mika had registered LCAs in Māhā'ulepū to which Kalanikumai has kuleana rights. Court documentation demonstrates that some 300 acres of Māhā'ulepū Valley land was in tenant Kalo cultivation as late as 1899.

Kalanikumai collects 'aweoweo (*Chenopodium oahuense*), herbals, botanicals, and vegetation; has documentation to show that he has repeatedly used trails in Māhā'ulepū since returning to Kauai in 1989. He frequents Hau'ula, the 'Aweoweonui Burial Dunes, "Hidden Valley", the "Petroglyph field"; Unu Heiau; Plateau; Bamboo groves and Waterfall above the Plateau; and the Pa’a- Māhā'ulepū Alahele, as well as the coastal & beach shoreline. As Kalanikumai believes there are post-Contact burials in Māhā'ulepū near the LCAs, he would like further archaeological work conducted in this area. According to Kalanikumai, it was a common practice to bury infants, less than 1 year old, in lo'i with the kalo, so as to be absorbed by Haloa and nourishing successive generations. He has first-hand experience with this practice. When his infant sister died, his family buried her in the lo'i with the kalo that was his sustenance until seven years of age.

During the post-Contact Period, family burials were customarily interred within the LCA awarded plots containing habitations near the house site. Subsequent surface clearing activities removing signs of habitation for agricultural repurposing obscures, but fails to remove the presence of burials.

Kalanikumai mentioned that there was a habitation and ceremonial site on the plateau, above Māhā'ulepū Valley, used from the pre-Contact Period into the post-Contact Period. Kalanikumai also said that there were salt pans located down in the conservation zone outside of project area that are hydrologically linked to the valley's drainage as well as from Ditch 1, Ditch 2, and Waiopili Ditch. Restoration of this culturally significant unique practice, exclusive to Hawai‘i, limited to few environmentally suited locations, would be irrevocably precluded by the inevitable seepage of soil contaminants resulting from the Dairy installation. According to Kalanikumai, the heiau (State Site 50-30-10-2250) was of the Unu type or classification of the heiau (i.e., a low circular structure, with northern and southern doorways). The heiau was an agricultural heiau associated with the god Lono, but was also associated with other ceremonies, including the ceremony of the First Fruits and Makahiki. Kalanikumai stated that he is planning on conducting a First Fruits Ceremony at State Site 50-30-10-2250 in the near future. The unu 'unu is not separate from the petroglyph heiau or the petroglyph boulders in the back of the valley, which are associated with the god Kāne and Lono; “…they are all part of one… different practices were conducted at the different areas there.”
Kalanikumai also stated that he recently conducted two ceremonies in Māhā'ulepū Ahupua'a [February and March 2015] during New Moon at State Site 50-30-10-2250. Māhā'ulepū is also associated with the goddess Laka. There is a burial cave on the plateau and two sacred bamboo groves are located above the plateau, between 800 and 900 feet above the valley floor, that are associated with the legendary demi-god (Kupua) Palila of the House of Moana. The legend of Pele's sister Hi'iaka-I-Ka-Poli-'O Pele recounts how Hi'iaka addressed prayers of supplication toward the Heiau of Laka, positioned in the meadow sheltered in the lee of Hā'upu's prominent knoll. There is a Lele (a jumping off space or portal) known as Ke O Lewa, located in the atmosphere, suspended in the heights, above Mount Hā'upu.

Kalanikumai stated that pre-Contact Period burials are located all along the mountain and coastal cliffs, in crevices and in caverns. During the post-Contact Period, people would inter their dead near their homes. Kalanikumai believes that the historic burials on the valley floor, in the LCAs, were not impacted by the commercial production of sugar, as only the ground surface was graded and scraped. So, Kalanikumai believes there may still be Historic burials there. Prior to WWII there was a village at Māhā'ulepū. After the WWII, the people were displaced from the valley.

Kalanikumai confirmed that the plateau, located approximately 450 to 600 feet above the valley floor, was designated as a pu'u honua (see Kauelani Kahalekai testimony below). He has collected herbs, flowers, plants, spring-water, calcite minerals and other native resources in Maha'ulepu Ahupua'a for over 25 years, following in the footsteps of his Kupuna Kaluhimoku Nakapa'ahu, a Kahuna La'a Lapa'au (son of the Ali'i Nui), whose practice in this area has been documented.

**Concerns**

Kalanikumai is concerned with access to the valley, highlands and natural resources; that seepage and discharge from the dairy will contaminate the Kalo Lo'i, the salt pans, the Makauwahi Cave Complex, Wetlands and near-by Waiopili Heiau. He believes there may still be Historic burials in the LCAs and would like to see additional archaeological work in this area. Kalanikumai would like to see Māhā'ulepū Ahupua'a preserved in vegetative and biodiverse crops.

Kalanikumai believes that vegetative crop cultivation is the best and highest use of this environmentally sensitive and fragile area. Kalo and Pa'akai cultivation and production are cultural priority crops. Historic uses have demonstrated success with 'Uala (Sweet Potato), Oranges, 'Ulu, and other dioecious crops. Introduction of associated airborne, water, and soil contamination on a scale of magnitude such as is inevitable with this project will produce a
devastating effect, not only upon the environment and shoreline, but accordingly, upon the economy; businesses; tax base; tourism; residents; health and welfare of the community. Ignoring facts, dissembling or prevarication thereof, misrepresentation or promotion of inaccuracies, distorting information revealed thru Community scrutiny in examination of the impact and details of this intended operation is morally reprehensible. The continuation of presenting slanted distortions of fact that fly in the face of reason only prolong the inevitable, and display corporate consumptive greed over public welfare, besmirching the character of those who would continue to deny the devastating effect this would have upon our Island.

Kalanikumai Ka Maka'uli'uli 'O Na Ali'i Hanohano
Waiuka Poele'ele, Awawa Lawa'i, i Kona Kaua'i. 18 Aukake [August] 2015.

REVEREND DOCTOR ALAN AKANA

Reverend Doctor Akana has family roots on Hawai‘i and Kaua‘i Islands, now lives on Kaua‘i, and is the pastor of Kōloa Union Church. Reverend Akana hikes, runs, and swims in Māhā'ulepū. He has visited the Makauwahi Cave Reserve on several occasions and is aware of its rich cultural importance. Although he knows of no other specific cultural sites, he feels the importance of the area. Reverend Doctor Akana said that Māhā'ulepū feels like a special place to him, he sees Māhā'ulepū as a “cultural kipuka” (i.e., an old growth area surrounded by more recent lava flow), and as a place for Hawaiian people to gather. Reverend Akana understands the importance of being connected to an area and believes it is important to have a “sense of place.” He also stressed the importance of having undeveloped areas as nature reserves for people to be able to retreat, away from modern development. Reverend Akana also stressed the importance of people who are connected to the land to have a say in what happens to land and how it is used. He believes it is important that “sacred places” are preserved for the people, regardless of who owns the land. He comes from farming and agricultural family and is not opposed to agriculture or dairy. Per se, Reverend Doctor Akana understands the importance of “sustainable agriculture,” but is not convinced that it applies to the proposed dairy at Māhā'ulepū.

Concerns

Mr. Akana is concerned that the people culturally connected to the land have a say in how it is used. He believes that it is important that some areas remain pristine, undeveloped, and available to the public, in order for people to have a place to go to feel connected to the land, to a place, to each other, and to their history. Mr. Akana is not convinced that the plan for the planned dairy at Māhā'ulepū is good for the Hawaiian people, nearby residents, the water table or shoreline.
LLEWELYN “BILLY” KAOHELAULI'I

Mr. Kaohelauli'i is the Moku for the Kona District, one of the six and the largest of the Moku Districts on the Island of Kaua'i. Within the Kona Moku, there are 11 Ahupua'a, one of which is Māhā'ulepū. As the Moku for this District, it is his duty to work with the Ahupua'a representative of Māhā'ulepū (among others) and do whatever he can to communicate with the Department of Land and Natural Resources. In his position as the appointed Hawaiian representative, he is committed to protecting and preserving the water and other environmental resources of the areas of his District.

Mr. Kaohelauli'i was born in Waimea Hospital (Kaua'i) in 1950. He has lived all his life in Kōloa, and is the fourth generation fisherman in a family who's initial roots were at Māhā'ulepū. The most important things to him are fishing and farming, which he sees as providing sustainability for the people of the ahupua'a. He has spent his life helping the people of the Kona District, teaching youth how to fish and gather opīhi and limu. His ancestral background and life's activities were a likely influence in his selection by more than 200 Kupuna as the Moku for the Kona District.

Mr. Kaohelauli'i has fished every bay from Po'ipū all the way to Līhu'e, the whole coast, and all the way down to the west side of the island. He has fished/gathered for limu, opīhi, wana, loli, uhu, manini, kala, menui, weke, moi, aholehole. Mr. Kaohelauli'i stated that fishponds and fishing grounds are located along the coastline of Māhā'ulepū and that one of the fishing areas is located near “kitchen rock.” Mr. Kaohelauli'i's parents used to go back by the heiau in Māhā'ulepū (State Site 50-30-10-2250) to collect plants including, maile, mokihana, and the seeds of black eyed susans for lei making.

The main thing they used to gather was the water from Hidden Valley ('Aweoweonui) - from the fresh water spring, which is located “high up” in the valley. Hidden Valley is located on the other side of Māhā'ulepū Ridge. In Hidden Valley ('Aweoweonui) there is a spring and a grove of Java plum where the cows, horses, and pigs gather. (Kalanikumai interjects that this is where Nakapa'ahu's residence was – on a 9 acre parcel in 'Aweoweonui/Hidden Valley). All the local people went there to collect the fruits and water, which was known for being clean and pure. Mr. Kaohelauli'i's grandfather used to own 100 acres of land in the Valley. The land was given to Mr. Kaohelauli'i by Eke Opunui, the ali'i of Po'ipū.

The area can still be accessed by trails which are currently used by hunters. When Mr. Kaohelauli'i used to hunt, he would climb up the mountain, from Māhā'ulepū side, down the ridge, to a road going across and to another trail that goes to Black Mountain. Trails go across to Kīpū Kai, and back by Makawehi Cave. When Mr. Kaohelauli'i was a boy, even when his father
was alive, they used to go to an area of Makawehi Cave to gather Hawaiian herbs, including pilo, for medicinal use. Back in the day, the area was very spooky. No one wanted to go there at night because it was a known Hawaiian burial area and people were said to see spirits walking. When Mr. Kaohelauli'i was young, he used to walk trail from Po'ipū to Māhāʻulepū, as this area was the family gathering area. Mr. Kaohelauli'i has lived on fish all his life and still engages in subsistence fishing today. He is a strong believer in sustainability so that the resources will be available for future generations.

**Concerns**

Mr. Kaohelauli'i expressed concerns about the negative impacts the dairy will have on contaminating the streams, ponds, wells, and the ocean, all fish, the reef and fishing. It will adversely impact Kauai's resources, such as the reef, the fish, the drinking water, and fishing. As a strong proponent of sustainability, Mr. Kaohelauli'i favors a balanced ecosystem and wants fish and lands for farming to be available for future generations.

Mr. Kaohelauli'i was recently denied access to the heiau at Māhāʻulepū for cultural practices by Grove Farm, because of the lease with Hawaii Dairy Farms. This is a violation of the State Constitution and the Hawaii Revised Statutes, which provide access for ongoing traditional uses and cultural practitioners.

Mr. Kaohelauli'i is also concerned that there are Hawaiian families still in the area with unresolved LCA (Land Commission Awards) Claims in the very area where the Dairy is planned to be. Mr. Kaohelauli'i is worried that although many of the families still live in the area, they were not contacted for their cultural input or to find out about their sustenance fishing, hunting, and gathering practices in this area. He believes a more in-depth study of the ongoing use of this Valley and its waters and coastline should be conducted.

**TERRIE HAYES**

Ms. Hayes visited the islands for 30 years before coming to live here over 13 years ago. Ms. Hayes, a teacher and educator by trade, has now been living with Mr. Kaohelauli'i on the Kaohelauli'i family property in Kōloa for twelve years. Ms. Hayes stated that Mr. Kaoheluli'i also fishes in Pāʻa Ahupua'a, which is where the fishponds are. Ms. Hayes is familiar with native plants and understands farming. Ms. Hayes explained the Aha Moku system of resource management, which utilizes traditional native knowledge of agriculture and fishing as a method of preserving natural resources. Ms. Hayes stated that the Aha Moku system of management, which was enacted by the legislature as SB 288 in 2012, empowers the kanaka maoli and gives them a voice.
Concerns

Ms. Hayes' greatest concerns are the potential impacts the dairy will have on the environment, specifically to the drinking water, groundwater, ocean, and reef. She is also very concerned about the kanaka maoli being kept from their customary access – access is imperative to maintain their traditions. Ms. Hayes stated that tests have shown that the soils in Māhā'ulepū are clay based and while suitable for some agriculture like Taro, they are poorly draining which will increase the risk of Waste runoff. Historically, the sugar plantation put in a large network of ditches to carry the excess water that collects on the soil surface, to the ocean. Ms. Hayes explained that the dairy representatives told them that they have restored the ditch network and intend to use it, admitting that they still drain to the ocean. The ditch system running through the dairy property increases the risk of contamination of all waters in Māhā'ulepū.

In addition, the roads to Māhā'ulepū are now gated and locked making accessibility very difficult to impossible. Ms. Hayes believes it is also extremely important to preserve the cultural resources for future generations.

The proposed HDF Plan claims that there will be zero discharge of waste, stating no waste will leave their farm. They seem only to have considered runoff in that statement; because there is no way that they can prevent groundwater contamination in the areas where the soil is well draining. According to their Plan, they need to pump and empty the effluent ponds when there is a hurricane. They also say that this process takes approximately 96 hours to empty the ponds. Thus far this hurricane season would have forced the emptying of effluent ponds six times in the past three months. This is an impending disaster that the sacred Māhā'ulepū Valley could not endure. Dairy representatives told us that each mature Dairy cow will produce approximately 143lbs. of wet manure and 8-10 gallons of urine per day. Even their starting herd of 699 pregnant cows will add more than 100,000 lbs of waste per day. As Poipu and Kōloa drinking water wells are also contained within the valley, contamination would be unavoidable. Ms. Hayes feels strongly that the proposed dairy would be terrible for the people of Kaua'i and in the future.

BRIDGET HAMMERQUIST

Mrs. Hammerquist is kama'aina, born in Hilo, Hawai'i prior to Statehood. She grew up on Sugar Plantations on the Big Island, as her father, Frank Sweeney, worked for Sugar Companies from the time she was born. She believes in agriculture and has many fond memories of her time on the Sugar Plantation, remembering issues about water in years that were dry and the effect on Sugar content when the cane was harvested. She and her brothers had a favorite pastime of sitting out on the porch when fields near the house were being burned, enjoying the ash that fell on their clothing. She knows that sugar companies didn't do everything right but she
learned a genuine concern for the environment. As a young person, attending Paauhau School, she raised a garden, an option to P.E. that Paauhau students were offered. She enjoyed selling the vegetables in the village and really believes in the importance of locally produced food.

When she was in high school, her father was transferred to Olokele Sugar Company, at Kaumakani Kaua’i. On weekends, it was a favorite pastime of her family to picnic, swim, and hike the trails in Māhā’ulepū. At the time, Grove Farm issued a car pass which she recalls was necessary for their entrance. For her, the treasures of Māhā’ulepū are the memories of the cultural treasures as well, including the petroglyph boulders, that she visited with her family when she was growing up. Now, Mrs. Hammerquist is raising her three grandchildren and resides full time in Kōloa on Kaua’i. Not only did she take her own children to Māhā’ulepū when they were growing up, often staying with her parents who lived in Weli Weli track, but she continues to share the joys of Māhā’ulepū Valley with her grandchildren. They have hiked, snorkeled, ridden horses, and all have enjoyed multiple visits to the Makauwehi Cave.

Mrs. Hammerquist became concerned about the impact of the proposed Dairy when she read the Dairy’s plan and learned about the amount of waste that would be produced and the amount water that would be consumed, 2.93 million gallons daily (MGD) from the Waita Reservoir for irrigation. In addition, the dairy intends to draw potable water for the cows to drink and for washing their udders, all from the Māhā’ulepū Wells. She is also very worried about the amount of biting flies (already on Kaua’i at some farms) that will breed and multiply in the large waste deposits from the proposed dairy herd. From her background as a nurse, she fears the spread of Zoonotic diseases by the flies. She also feels the flies will be very damaging to the South Shore visitor population. She explained that the Dairy representatives have stated their goal is for a 2,000 cow dairy, starting with 699 pregnant cows. On page 42 of their plan, the dairy states that each cow will produce at least 143 pounds of wet manure per day not including 8-10 gallons of hormone and ammonia laden urine daily. Mrs. Hammerquist says, when you do the math, there will be more than 100,000 lbs. of waste per day of waste from the start up herd, and more than 300,000 lbs. per day once the herd is expanded to 2,000 cows. When she attended Hawaii Preparatory Academy on the Big Island, she regularly rode with Mr. Samulsen on Parker Ranch pastures. She recalls that cow manure remains on the ground for a long time. As a result, she is very concerned about the massive accumulation of waste over time, even when it falls on grass, increasing the risk of further contamination of the ditches, Waiopili Stream, groundwater, and nearby coastal waters.

On review of their plan, Mrs. Hammerquist read that there is to be an 81 acre manure and sludge pad that the Dairy plans to locate approximately 750 to 1,000 feet from three existing County wells that currently supply drinking water for all of Pō’ipu and much of Kōloa. She
became more concerned after reading the soils study and learning that the soils of the valley are primarily poorly draining, with one of the exceptions in the 81 acre proposed manure and sludge pad (their block H). The Dairy's plan calls for pumping the effluent pond contents onto the 81 acre pad every 5 weeks, the area closest to the County Wells. The sludge pumped from the effluent ponds to Block H, will be an addition to any manure deposited by the cows that graze on that same area. Thus, she is concerned that the sludge will percolate down into the water table and the well capture zone, contaminating the drinking water. She has read numerous reports of communities in the Mainland United States (New Mexico, New York, Washington, Wisconsin, Iowa, and others) that have lost wells due to nitrate infiltration. She reported that in Des Moines, Iowa, a city of 504,000, they are projecting a cost of $100 million to purchase, install, and operate a plant to extract the unsafe nitrates from their potable water.

**Concerns**

Mrs. Hammerquist has expressed deep concerns about manure and sludge seepage from the dairy contaminating drinking water, making it very difficult for residents of Pō'i-pu and Kōloa to continue who have to rely on the County Wells as their sole source of drinking water. She is also concerned that the runoff from the dairy will flow into the ocean and contaminate the coastal area and marine resources, which will negatively affect the people who use those resources for subsistence. Mrs. Hammerquist is also concerned about access, as the gates into the valley area are now gated and locked. With access now denied, she fears that this rich cultural experience, enjoyed by many and the site of a routine, third grade field trip for Kōloa School (among others), is now lost. She views the valley as a local environmental and cultural treasure that is important for the people of Kaua'i now and for the future generations to experience.

The April 17, 2015 interviews were held at Kōloa Neighborhood Center Annex, former judge's chambers, and conducted, in person, by Ms. Dagher. Initially, the April 17, 2015 interviews were slated to be private, individual, interviews. However, as all in attendance were in agreement, the private interview organically morphed into a group conversation. Those interviewed on April 17, 2015 included:

- Teddy Blake
- Napua Wong Romo
- Catherine Lo
- Karl Lo
TEDDY BLAKE

Mr. Blake was raised from birth to third grade in Ho’ai, Kualu, Kōloa, his house was right next to Kūhiō Park. When he was in third grade, his family moved to the present family residence on Waikomo Road, in Kōloa. Long time Kōloa residents refer to the entire area from Waitā Reservoir all the way down to Māhā'ulepū as one area. So, when facing the Kōloa Mill, everything before you was Māhā'ulepū. Mr. Blake spent a lot of time growing up in Māhā'ulepū, as did Napua Wong Romo and David Chang. Growing up, weekdays, after the chores were finished; weekends; vacations; and holidays were spent exploring the Māhā'ulepū area.

Waita Reservoir, the largest man-made reservoir in the State of Hawaii, was built in 1906 by Grove Farm. The water from Waita Reservoir was a source of irrigation water for the entire south side of the island. Following the construction of the reservoir, the production of sugar cane increased dramatically. When Mr. Blake was growing up, Māhā'ulepū, in its entirety, was in sugar cane, while approximately ¾ of the ahupua’a of Weliweli and Pāʻā were under the commercial production of sugar cane. Waita Reservoir was a source of recreation and his friends played there throughout their childhood. At the reservoir, they fished for blue gills and encountered native plants, including mokihana (Rutaceae Melicope anisata), maile oli (Alyxia sp.), and introduced plants such as tapioca root, coffee, cacao. Coffee and cacao were planted by the plantation as possible cash crops. A mud slide at Watagi Falls was another area of recreation frequented by Mr. Blake and his childhood friends.

Mr. Blake’s childhood treks to Māhā'ulepū were for camping, swimming, and fishing at Kawailoa Bay, now referred to as Māhā'ulepū. The Vasconcellos family raised cattle in the area. Although the Vasconcellos sons were older than Mr. Blake, he knew who they were: “Blondie” Vasconcellos and his brother David worked for Grove Farm, where Blondie ran the quarry and David was a mechanic at the shop.

Although he was not interested in cultural sites when he was growing up, Mr. Blake had seen petroglyphs in Māhā'ulepū and an agricultural heiau at Ka Lae o Kahonu, a promontory on the west side of Māhā'ulepū. The next point of importance was a small heiau called Keolewa (Keonelewa), which was dedicated to the goddess Laka, located on top of Mount Ha'upu. The floor of Keolewa is covered in ocean sand. The agricultural heiau, Waiopili, is also close by.

Two to three hundred years before Kamehameha I attempted to conquer Kaua‘i, the battle of Kaweliweli‘iwi occurred. The king of Kaua‘i, at that time was Kukona, his son was Manokalanipo. Kalaunuiohua, a chief from the west side of Hawai‘i Island, had set his eyes on Maui, and when he felt the time was appropriate, he brought his forces together and conquered the king, who was Kamaluahua. From Maui, he went to Moloka‘i and conquered the king there.
With the two conquered kings with him, Kalaunuiohua traveled to O'ahu and conquered the ali'i (chief) of the west side of the island, before heading for Kaua'i. However, Kukona had heard that Kalaunuiohua was coming and was prepared for him. All of the Kaua'i chiefs united under Kukona and decimated Kalaunuiohua when he and his fleets came ashore along the Kōloa coast, at Kīpū. Mr. Blake believes that most of the human skeletal remains in the beach sands of Māhā'ulepū are from this battle.

Mr. Blake states that in his lifetime, there were no communities at Māhā'ulepū. No one lived there because it was all in sugar. Mr. Blake is the limu (algae) gatherer of his family. His favorite is limu kohu (Asparagopsis taxiformis), which is hard to find as it does not grow prolifically along the coast as other limu do. Limu kohu is high in iron and is good for the blood, so and he often was sent out by his father to Māhā'ulepū to collect it for his mother and sister to give them another boost of iron. Na'akea is the first bay you come to when coming around Kawelikoa Point. Although it was a long walk from his house and not easy to get to, Mr. Blake would often collect the limu kohu from Na'akea Bay (also known by its popular name, Second Ha'ula), because he knew that if it couldn't be found at the regular spots, it could always be found there, as it could be at Ha'ula. Ha'ula is a type of limu, but Mr. Blake has never eaten it, doesn't know how it can be used, nor does he remember hearing his parents or grandparents talk about it. Fishermen caught 'ulua and other fish by shoreline cast fishing on the points.

Continuing along the coastline to the south, you come to Kawaiola Bay, which is sandy and where people liked to camp. Mr. Blake would come to spend the weekends there fishing, swimming, and camping and end up spending the whole summer. From Kawaiola Bay, the sandy beach extended all the way to Waiopili Stream. This is presently called Māhā'ulepū Beach, as Kawaiola is also called Māhā'ulepū Beach today. The proper name is Kāmala and it extends a point to the north a short distance past Waiopili Stream. Just west of Waiopili Stream is the seaside border of Māhā'ulepū Ahupua'a and Pā'ā Ahupua'a.

Waiopili Stream started from the Kapunakea Spring, located near Waiopili Heiau. The spring was named for the white coral walls of the spring. Mr. Blake believes that there are no archaeological sites on the Māhā'ulepū Valley floor, he believes they were destroyed by the commercial production of sugar cane. He is not sure when sugar cane came to Māhā'ulepū, but the commercial production of sugar cane started on Kaua'i in 1835. The valley floor was deep-plowed twice every two years, which would have destroyed any archaeological sites that were there.

Mr. Blake says the clayey soils of Māhā'ulepū make it one of the best places to grow taro. As the sub-soils were comprised of clay, very little water was lost because the water could not permeate through the soil. Mr. Blake said that he had been told that the entire Māhā'ulepū
Valley, approximately 400 acres, had been in taro at one time. Mr. Blake goes on to say that none of the pesticides used by the plantation have impacted the ground water Māhā’ulepū, because the soil is impermeable.

Concerns

Mr. Blake doesn't believe the proposed Māhā’ulepū dairy will have a negative impact on the environment or on traditional cultural practices, previously or currently, conducted in Māhā’ulepū Ahupua'a.

Catherine and Karl Lo

Mrs. Lo first was not born here. The first time she came to hear about Māhā’ulepū was when Charles Tanimoto wrote the book “Return to Māhā’ulepū, which was published in 1982. At that time she and her husband, Karl, went to the library to borrow the book. Mrs. Lo is writing a book about New Mill Camp and one of the things she noticed was that the people she is interviewing keep going back to their childhood days when they were fishing and picnicking.

There was a Māhā’ulepū Camp, where Mr. Tanimoto was born and lived with his family, that dates back to the turn of the 19th century. The plantation had wells in Māhā’ulepū and Mr. Tanimoto's father was one of the mechanics that maintained the power plant that pumped out water to irrigate the cane fields. When Mr. Tanimoto was 75 he returned to Māhā’ulepū see where he grew up. He remembered the fishing; he looked for the wells, etc.

There was a small camp located in the shadow of Mount Hā'upu, near Koloa Mill, called New Mill Camp, where workers and their families lived. Many of former residents of New Mill Camp remember hiking to and overnight fishing at Black Mountain and picnicking, fishing, and camping at Māhā’ulepū’s Kawaiola Beach. They also remember going to Gillin's Beach during the 1950s and 1960s, when Māhā’ulepū was pristine.

Mrs. Lo recalls that after the hurricane of 1992, she and Karl went to Māhā’ulepū see the petroglyphs which had been exposed for the first time in years. By the time they got to the site, a day or two after they learned about it, sand had covered the petroglyphs.

Concerns

Catherine and Karl Lo submitted a letter, via e-mail dated April 17, 2015, which expresses their concerns about the dairy (Appendix E).

James (Jim) H. Case

In 1918, Mr. Case's father graduated from the University of Hawai‘i and joined the Hawaii National Guard. Soon after graduation, the Hawaii National Guard was mobilized, and Mr. Case's father was immediately assigned to the North Shore of O'ahu to guard Hawai‘i from
attacks by Germans and Austrians. That same year, Mr. Case's mother graduated from the University of California, Los Angeles. Mr. Case's mother's roommate was from Honolulu. So, following graduation, Mr. Case's mother went to Honolulu to visit her roommate. She liked it there, got a job, and met Mr. Case, Sr. Along the way, his parents married and Mr. Case was born on April 10, 1920, on Grove Farm. The house Mr. Case grew up in was located right in the middle of Grove Farm Plantation, about 200 yards away from G.N. Wilcox's house and office.

In 1920, following the end of World War I, Mr. Case, Sr., was hired by Grove Farm. According to Mr. Case, Grove Farm was started on the site of a huge kukui grove, and that is how Grove Farm came to be named. George N. Wilcox [owner of Grove Farm] acquired all of the land on the west side of a stream, which was located within a deep gulch, which emptied into Nāwiliwili Bay. Lihue Plantation is located on the east side of the stream. Mr. Wilcox gradually acquired all of the land on the west side of this stream up to the Kōloa Gap, with the exception of the Kīpū Ahupua'a, which was acquired by the Rice family a long time ago. The main valuable lands were located on the east side of Ha'upu Ridge. This area consisted of nice flat land that was good for the cultivation of all types of crops. This area includes Hulē'ia River, which flows along the bottom of the ridge, a large fishpond that is still there, but not Kīpū Kai (the seaward portion of Kīpū Ahupua'a).

Jim Case was born in 1920 at Grove Farm. The family home was 200 yards away from George N. (G.N.) Wilcox's house and office. As a boy, Mr. Case would go down on his bicycle to the (12 to 15 acre) Grove Farm dairy every morning, at 6 am, with a pale, to get milk. Jim Case went to elementary school at the Līhu'e Grammar School until the age of 13. His classmates included Elizabeth Knudsen, whose family owned a huge swath of land in the Kōloa/Po'iipi'i area. The Knudsen family home was at a place called Waiohai, on the beach at Po'iipi'i. Mr. Case visited there frequently throughout his youth, where he played polo with them. Outside of the plantation, the Knudsen family was one of the largest land owners in the area and very knowledgeable about the area. Mr. Case learned about the Kōloa area through his childhood friend, Elizabeth Knudsen.

Another one of Mr. Case's classmates was John Troop Moir, III, the son of the Koloa Plantation manager. As a boy, Mr. Case spent a lot of time at the Moir's house. He and John Troop Moir, III, went swimming at the beach, swam and fished at the [Waitā] reservoir, and drove around the fields.

Mr. Case got to know the Kōloa area even better through G.N. Wilcox's nieces, Ethel and Mabel Wilcox. They owned a beach home overlooking Brennecke's Beach, one of the best body surfing spots at the time. Every summer Ethel and Mabel loaned this house to Mr. Case's family. Mr. Case spent his childhood summers in this portion of Po'iipi'i, where he and his family often
drove the family car on a dirt road along the length of Māhā'ulepū Beach, stopping to swim and picnic along the way. Mr. Case stated that he and his family saw [human] bones, which were extruded out of the ground, in the sand dunes at the main beach. Some say there was a huge battle there. Mr. Case believes that Native Hawaiians lived near the beach and buried their dead close to where they lived and that it is not likely that the Native Hawaiians buried their dead in their taro patches.

Mr. Case stated that during his youth he saw no evidence of any habitation or of Hawaiian trails during his youthful driving excursions along the dirt roads within the sugar plantation. Although, he did observe Hawaiian trails on the sand dunes. He never climbed Mount Ha'upu Ridge, as "it was a long way up." He has hiked all over the Nāwiliwili side of Ha'upu Ridge from Kīpū Kai to Nāwiliwili Bay along ancient Hawaiian Trails. Of note, in this area is a ledge overlooking the entrance into Nāwiliwili Bay. The konohiki would climb to this ledge to sight schools of fish. When the konohiki sighted a school of fish he would blow his conch shell to notify the fishermen. This was still occurring during Mr. Case's childhood. As a boy, Mr. Case knew a konohiki there whose daughter was a few years ahead of Mr. Case in school and whose son played tennis with Mr. Case.

According to Mr. Case, no one he knew would go from Kōloa to Līhu'e over the mountain because Kōloa Gap was right there. Mr. Case believes the Hawaiians did go through Kōloa Gap because the only alternative route was by boat and the ocean was rough. Mr. Case said it was possible to travel by boat from Kōloa to Nāwiliwili Bay in order to access Kīpū Kai. Based on Mr. Case's knowledge of Hawaiian history, there would have been trails from the beach and lowlands up the mountain that the Hawaiians used to access areas for gathering flowers and plants for food and medicinal purposes. However, he never heard of any trails in the dairy area. Mr. Case stated that there are other ways to access the mountain without going through the dairy.

Mr. Case's knowledge comes from growing up on Grove Farm, spending a lot of time visiting with his classmates in Kōloa and spending summers in Po'ipū. Most of Mr. Case's information, in terms of what went on the old days," was learned from Elizabeth Knudsen's father, Erik, whose family had lived on Kaua'i for many years. Mr. Case and his friends did not spend much time in Māhā'ulepū because the area was covered in sugar cane fields, although they did go through the sugar cane fields to access Waitā Reservoir.

In 1948, G.N. Wilcox acquired Koloa Plantation and incorporated it into the Grove Farm Plantation. Prior to 1948, Grove Farm and Koloa Plantation were entirely separate operations. In 1948, Mr. Case was in law school and his father was the chief financial officer, for Grove Farm, where he was responsible for all of the plantation operations, with the exception of the
agricultural operations. Mr. Case Sr. negotiated this acquisition from the owners of the Koloa Plantation from AMFAC. As Mr. Case was studying corporate law, his father sent him copies of all the paperwork associated with this acquisition, which allowed him to go through the acquisition process as a law student.

**Concerns**

Mr. Case doesn't believe the proposed Māhā'ulepū dairy will have a negative impact on the environment or on traditional cultural practices, previously or currently, conducted in Māhā'ulepū Ahupua'a.

**SUMMARY**

The “level of effort undertaken” to identify potential effect by a project to cultural resources, places or beliefs (OEQC 2012) has not been officially defined and is left up to the investigator. A good faith effort can mean contacting agencies by letter, interviewing people who may be affected by the project or who know its history, researching sensitive areas and previous land use, holding meetings in which the public is invited to testify, notifying the community through the media, and other appropriate strategies based on the type of project being proposed and its impact potential. Sending inquiring letters to organizations concerning development of a piece of property that has already been totally impacted by previous activity and is located in an already developed industrial area may be a “good faith effort.” However, when many factors need to be considered, such as in coastal or mountain development, a good faith effort might mean an entirely different level of research activity.

In the case of the current undertaking, letters of inquiry were sent to individuals and organizations that may have knowledge or information pertaining to the collection of cultural resources and/or practices currently, or previously, conducted in close proximity to the proposed dairy to be located on an 557-acre property within Māhā'ulepū Valley, Māhā'ulepū Ahupua'a, Kōloa District, Island of Kaua'i. The property is owned by Mahaulepu Farms, LLC and comprised of TMK: (4) 2-9-003-001 por. & 006 por. and (4) 2-9-001:001 por.

Historical and cultural source materials were extensively used and can be found listed in the References Cited portion of this report. Such scholars as Samuel Kamakau, Martha Beckwith, Jon J. Chinen, Lilikalā Kame'eleihiwa, R. S. Kuykendall, Marion Kelly, E. S. C. Handy and E.G. Handy, and Mary Kawena Pukui and Samuel H. Elbert continue to contribute to our knowledge and understanding of Hawai‘i, past and present. The works of these and other authors were consulted and incorporated in this report where appropriate. Land use document research was supplied by the Waihona ‘Aina Database (2014).
CULTURAL ASSESSMENT

Analysis of the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place is a suggested guideline of the OEQC (2012). As indicated by the responses received from the community, the broad area constituting Māhā‘ulepū Ahupua‘a, has been, and is currently, used for traditional cultural purposes. However, the project area itself is not being utilized for these activities. The areas used to gather plants and marine resources; the plateau; the coastal petroglyphs; the trails; State Site 50-30-10-2250 (the agricultural heiau); and State Site 50-30-10-3094, Feature 3 (a petroglyph boulder), are all located outside of the project area.

Of the eleven individuals interviewed, two individuals believed that the dairy would not have an impact on traditional cultural practices or to the environment. The remaining individuals expressed a variety of concerns about impacts the proposed dairy may have which are indirectly and directly related to traditional cultural practices. The indirect negative impacts would affect:

- The environment (i.e., seepage, discharge, and runoff would impact the groundwater, drinking water, and the watershed, the reef, the ocean and marine resources, and the smells will pollute the air);
- Activities the interviewees enjoyed as children would not be experienced by future generations (i.e., camping, hiking, swimming); and to
- Archaeological/cultural features and sites located along the coast (i.e., the salt pans, the “kitchen” or “kitchen rock”, Makawehi Cave, and Waiopili Heiau, and the coastal petroglyphs).

Many the interviewees go to Māhā‘ulepū Ahupua‘a to conduct traditional cultural activities. These individuals expressed concerns regarding restricted access to Māhā‘ulepū Ahupua‘a and to the adjacent coastal area, restricted access to the trails within the ahupua‘a, which are utilized to gather natural resources for cultural purposes, and restrictions on conducting traditional ceremonies within the ahupua‘a. Concerns were also expressed in regards to impacts to the natural resources gathered and collected from the area resulting from the proposed dairy polluting the air, land, and the water. The traditional cultural activities include collecting specific terrestrial and marine resources and conducting ceremonies.

- Native plants gathered from Māhā‘ulepū Ahupua‘a, for traditional use include; ‘aweoweo, maile, mokihana, ‘ohi‘a ’ai, pilo, hinahina, limu kohu, mokihana, maile oli, and various native fruits and limu. Non-native plants collected from Māhā‘ulepū Ahupua‘a for traditional use include the seeds of black eyes susans, cat’s claw, and Java plum. These plants are used as medicines, in lei making, in ceremonies, traditional dance, and as food resources
• At least one traditional ceremony was recently conducted in Māhā'ulepū Ahupua'a;

• Native fish, used as food resources, caught from the waters of Māhā'ulepū Ahupua'a include ʻulua, opihi, wana, loli, uhu, manini, kala, menui, weke, moi, aholehole.

• The spiritual connection between the people and the land;

CONCLUSION

While some members of the community expressed concern about impacts from the dairy, others did not. Given the ability of the Environmental Impact Statement to address these impacts, it seems reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights, or any ethnic group, related to numerous traditional cultural practices including, gathering, access, cultivation, the use of traditional plants, and the use of trails, will not be adversely impacted by the proposed dairy.

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APPENDIX A: EXAMPLE LETTER OF INQUIRY
In compliance with the State of Hawai‘i Revised Statute (HRS) Chapter 343 Environmental Impact Statements Law, and in accordance with the State of Hawai‘i Department of Health’s Office of Environmental Quality Control (OEQC) Guidelines for Assessing Cultural Impacts as adopted by the Environmental Council, State of Hawai‘i on November 19, 1997, Scientific Consultant Services, Inc. (SCS) is in the process of preparing a Cultural Impact Assessment (CIA) in advance of proposed improvements for a proposed dairy farm property located within Māhā‘ulepū Valley, Māhā‘ulepū Ahupua‘a, Kōloa District, Island of Kaua‘i. The property is owned by Māhā‘ulepū Farms, LLC. [TMK: (4) 2-9-003-001 por. & 006 por. and (4) 2-9-001:001 por.] (Figures 1 and 2)

Scientific Consultant Services has conducted an Archaeological Inventory Survey of the proposed project area (Putzi et al. 2014, in prep.) in order to determine the presence of archaeological cultural materials. During the survey, one previously identified historic property, a carved petroglyph boulder (State Site 50-30-10-3094), was re-identified and 15 historic properties were newly identified and documented (Putzi et al. 2014, in prep.).

According to the Guidelines for Assessing Cultural Impacts (Office of Environmental Quality Control, Nov. 1997):

The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs. The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man made and natural which support such cultural beliefs...

We are seeking any information that you or other individuals have which might contribute to the knowledge of traditional cultural activities that were, or are currently, conducted in the vicinity of the proposed project area. We are also asking for any information pertaining to traditional cultural activities or traditional rights which may be impacted by the construction of the proposed dairy improvements. The results of the cultural impact assessment are dependent on the response and contributions made by individuals and organizations such as yours.

Enclosed are maps showing the proposed project area. Please contact me at the Scientific Consultant Services, Honolulu, office at (808) 597-1182 or via e-mail (cathy@scshawaii.com) with any information or recommendations concerning this Cultural Impact Assessment.

Sincerely yours,

Cathleen Dagher
Senior Archaeologist
Enclosures (2)
APPENDIX B: NEWSPAPER NOTICE AND AFFIDAVIT
AFFIDAVIT OF PUBLICATION

IN THE MATTER OF
3C3 Proj 1663 CIA Notice

STATE OF HAWAII
City and County of Honolulu

Doc. Date: DEC 2 9 2014
Notary Name: Patricia K. Reese
First Judicial Circuit
Doc. Description: Affidavit of Publication

Lisa Kaukani being duly sworn, deposes and says that she is a clerk, duly authorized to execute this affidavit of Oahu Publications, Inc, publisher of The Honolulu Star-Advertiser and MidWeek, that said newspapers are newspapers of general circulation in the State of Hawaii, and that the attached notice is true notice as was published in the aforementioned newspapers as follows:

Honolulu Star-Advertiser 3 times on:
12/24, 12/25, 12/28/2014
Midweek Wed. 0 times on:

And that I am not a party to or in any way interested in the above entitled matter.

Lisa Kaukani

Subscribed to and sworn before me this 29th day of December, A.D. 2014

Patricia K. Reese, Notary Public of the 1st Judicial Circuit, State of Hawaii
My commission expires: Oct. 07, 2015

Ad # 0000702099

SP. NO.: _____________ I. N.
AFFIDAVIT OF PUBLICATION

IN THE MATTER OF
SCS Proj 1683 CIA Notice

STATE OF HAWAII
City and County of Honolulu

Doc. Date: DEC 2 9 2014
Notary Name: Patricia K. Reese
First Judicial Circuit
Doc. Description: Affidavit of Publication

Lisa Kaukau, being duly sworn, deposes and says that she is a clerk, duly authorized to execute this affidavit of Oahu Publications, Inc., publisher of The Honolulu Star-Advertiser and MidWeek, that said newspapers are newspapers of general circulation in the State of Hawaii, and that the attached notice is true notice as was published in the aforementioned newspapers as follows:

Honolulu Star-Advertiser 00 times on:
Midweek Wed. 0 times on:

GARDEN ISLAND

And that applicant is not a party to or in any way, interested in the above entitled matter.

Lisa Kaukau

Subscribed to and sworn before me this 29th day
of DECEMBER 20 14

Patricia K. Reese, Notary Public of the First Judicial Circuit, State of Hawaii

My commission expires: 12/27/2018

Ad #: 0900700891

SP. NO.: L.N.

11823
12/24/2014
Dear:

This is our follow-up letter to our December 23, 2014 2 letter which was in compliance with the statutory requirements of the State of Hawai‘i Revised Statute (HRS) Chapter 343 Environmental Impact Statements Law, and in accordance with the State of Hawai‘i Department of Health’s Office of Environmental Quality Control (OEQC) Guidelines for Assessing Cultural Impacts as adopted by the Environmental Council, State of Hawai‘i, on November 19, 1997.

Scientific Consultant Services, Inc. (SCS) is in the process of preparing a Cultural Impact Assessment (CIA) in advance of improvements to a dairy farm located within Māhā‘ulepū Valley, Māhā ‘ulepū Ahupua‘a, Kōloa District, Island of Kaua‘i [TMK: (4) 2-9-003-001 por. & 006 por. and (4) 2-9-001:001 por.]. The 580-acre property is owned by Māhā‘ulepū Farms, LLC.

In 2014, SCS (Putzi et al. 2014, in review) conducted an Archaeological Inventory Survey of the proposed project area in order to determine the presence, or absence, of historic properties. During the survey, one previously identified historic property, a carved petroglyph boulder (State Site 50-30-10-3094), was re-identified and 15 historic properties were newly identified and documented.

According to the Guidelines for Assessing Cultural Impacts (Office of Environmental Quality Control, Nov. 1997):

The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs... The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man made and natural which support such cultural beliefs...

We are seeking any information that you or other individuals have which might contribute to the knowledge of traditional cultural activities that were, or are currently, conducted in the vicinity of the proposed project area. We are also asking for any information pertaining to traditional cultural activities or traditional rights which may be impacted by the construction of the proposed dairy improvements. The results of the cultural impact assessment are dependent on the response and contributions made by individuals, such as you.

Please contact me at the Scientific Consultant Services, Honolulu, office at (808) 597-1182 or via e-mail (cathy@scshawaii.com) with any information or recommendations concerning this Cultural Impact Assessment.

Sincerely yours,

Cc:
APPENDIX D: SIGNED INFORMATION RELEASE FORM
INFORMATION RELEASE FORM

I, the undersigned, personally participated in an interview with Cathleen Dagher from Scientific Consultant Services, Inc., on April 17, of the year 2015. The interview was conducted by telephone, by e-mail, or in person.

I understand that the information I have provided to Scientific Consultant Services, Inc., shall be submitted as part of a Cultural Impact Assessment report on the proposed dairy farm property located within Māhāʻulepū Valley, Māhāʻulepū Ahupuaʻa, Kōloa District, Island of Kauaʻi. The property is owned by Mahaulepu Farms, LLC. [TMK: (4) 2-9-003-001 por. & 006 por. and (4) 2-9-001:001 por.]. This information will be subject to publication which will be submitted to the public for general review.

I have read the summary of the interview and the information is true and accurate to the best of my knowledge. By signing this release form, I am providing my approval for the release of the information to Scientific Consultant Services, Inc., for the purpose outlined above (i.e., making the contents of this interview available for publication to the general public).

Print Name: CATHERINE LO

Signature: Catherine Lo

Release Dated: August 11, 2015
INFORMATION RELEASE FORM

I, the undersigned, personally participated in an interview with, Cathleen Dagher from Scientific Consultant Services, Inc., on April 16, of the year 2013. The interview was conducted by telephone, by e-mail, or in person.

I understand that the information I have provided to Scientific Consultant Services, Inc., shall be submitted as part of a Cultural Impact Assessment report on the proposed dairy farm property located within Māhā‘ulepū Valley, Māhā‘ulepū Ahupua‘a, Kōloa District, Island of Kauai. The property is owned by Mahaulepu Farms, LLC. [TMK: (4) 2-9-003-001 por. & 006 por. and (4) 2-9-001:001 por.]. This information will be subject to publication which will be submitted to the public for general review.

I have read the summary of the interview and the information is true and accurate to the best of my knowledge. By signing this release form, I am providing my approval for the release of the information to Scientific Consultant Services, Inc., for the purpose outlined above (i.e., making the contents of this interview available for publication to the general public).

Print Name: TERRIE L. HAYES

Signature: [Signature]

Release Dated: SEPT. 5, 2015
INFORMATION RELEASE FORM

I, the undersigned, personally participated in an interview with, Cathleen Dagher from Scientific Consultant Services, Inc., on April 16, of the year 2015. The interview was conducted by telephone, by e-mail, or in person.

I understand that the information I have provided to Scientific Consultant Services, Inc., shall be submitted as part of a Cultural Impact Assessment report on the proposed dairy farm property located within Māhā‘ulepū Valley, Māhā‘ulepū Ahupua‘a, Kōloa District, Island of Kaua‘i. The property is owned by Mahaulepu Farms, LLC. [TMK: (4) 2-9-003-001 por. & 006 por. and (4) 2-9-401:001 por.]. This information will be subject to publication which will be submitted to the public for general review.

I have read the summary of the interview and the information is true and accurate to the best of my knowledge. By signing this release form, I am providing my approval for the release of the information to Scientific Consultant Services, Inc., for the purpose outlined above (i.e., making the contents of this interview available for publication to the general public).

Print Name: Bridget Hammerquist

Signature: [Signature]

Release Dated: 9-6-2015
INFORMATION RELEASE FORM

I, the undersigned, personally participated in an interview with, Cathleen Dagher from Scientific Consultant Services, Inc. on April 16, of the year 2015. The interview was conducted by telephone, by e-mail, or in person.

I understand that the information I have provided to Scientific Consultant Services, Inc., shall be submitted as part of a Cultural Impact Assessment report on the proposed dairy farm property located within Māhūʻulepū Valley, Māhūʻulepū Ahupua'a, Kāhū District, Island of Kaua'i. The property is owned by Makuʻu Farms, LLC. [TMK: 4 2-9-003-001 por. & 006 por. and 4 2-9-001.001 por.]. This information will be subject to publication which will be submitted to the public for general review.

I have read the summary of the interview and the information is true and accurate to the best of my knowledge. By signing this release form, I am providing my approval for the release of the information to Scientific Consultant Services, Inc., for the purpose outlined above (i.e., making the contents of this interview available for publication to the general public).

Print Name: Kalani Kauaikamaliʻi O Na Alii Harmony

Signature: Kalani Kauaikamaliʻi O Na Alii Harmony

Release Dated: 8/19/2015
INFORMATION RELEASE FORM

I, the undersigned, personally participated in an interview with, Cathleen Dagher from Scientific Consultant Services, Inc., on April 16, of the year 2015. The interview was conducted by telephone, by e-mail, or in person.

I understand that the information I have provided to Scientific Consultant Services, Inc., shall be submitted as part of a Cultural Impact Assessment report on the proposed dairy farm property located within Māhā’ulepū Valley, Māhā’ulepū Ahupua’a, Kōloa District, Island of Kaua‘i. The property is owned by Mahaulepu Farms, LLC. [TMK: (4) 2-9-003-001 por. & 006 por. and (4) 2-9-001:001 por.]. This information will be subject to publication which will be submitted to the public for general review.

I have read the summary of the interview and the information is true and accurate to the best of my knowledge. By signing this release form, I am providing my approval for the release of the information to Scientific Consultant Services, Inc., for the purpose outlined above (i.e., making the contents of this interview available for publication to the general public).

Print Name: Rupert Rowe
Signature: Rupert Rowe
Release Dated: 12/1/15
INFORMATION RELEASE FORM

I, the undersigned, personally participated in an interview with Cathleen Dagher from Scientific Consultant Services, Inc., on April 17, of the year 2015. The interview was conducted by telephone, by e-mail, or in person.

I understand that the information I have provided to Scientific Consultant Services, Inc., shall be submitted as part of a Cultural Impact Assessment report on the proposed dairy farm property located within Māhā'ulepū Valley, Māhā'ulepū Ahupua'a, Kīloa District, Island of Kaua'i. The property is owned by Mahaulepu Farms, LLC. [TMK: (4) 2-9-003-001 por.  & 006 por. and (4) 2-9-001:001 por.]. This information will be subject to publication which will be submitted to the public for general review.

I have read the summary of the interview and the information is true and accurate to the best of my knowledge. By signing this release form, I am providing my approval for the release of the information to Scientific Consultant Services, Inc., for the purpose outlined above (i.e., making the contents of this interview available for publication to the general public).

Print Name: Ted Kauohinohelani Blake

Signature: ____________________________

Release Dated: 9 September 2015
INFORMATION RELEASE FORM

I, the undersigned, personally participated in an interview with, Cathleen Dagher from Scientific Consultant Services, Inc., on April 16, of the year 2015. The interview was conducted by telephone, by e-mail, or in person.

I understand that the information I have provided to Scientific Consultant Services, Inc., shall be submitted as part of a Cultural Impact Assessment report on the proposed dairy farm property located within Māhā‘ulepū Valley, Māhā‘ulepū Ahupua‘a, Kōloa District, Island of Kaua‘i. The property is owned by Mahaulepu Farms, LLC [TMK: (4) 2-9-003-00] por. & 006 por. and (4) 2-9-001:001 por.]. This information will be subject to publication which will be submitted to the public for general review.

I have read the summary of the interview and the information is true and accurate to the best of my knowledge. By signing this release form, I am providing my approval for the release of the information to Scientific Consultant Services, Inc., for the purpose outlined above (i.e., making the contents of this interview available for publication to the general public).

Print Name: LLEWELYN H. KAHOELAVULI

Signature: ________________________________

Release Dated: SEPT. 5, 2015
INFORMATION RELEASE FORM

I, the undersigned, personally participated in an interview with, Cathleen Dagher from Scientific Consultant Services, Inc., on November 5, of the year 2015. The interview was conducted by telephone, by e-mail, or in person.

I understand that the information I have provided to Scientific Consultant Services, Inc., shall be submitted as part of a Cultural Impact Assessment report on the proposed dairy farm property located within Maha'ulepu Valley, Maha'ulepu Ahupua'a, Koloa District, Island of Kaua'i. The property is owned by Mahaulepu Farms, LLC. and is comprised of TMK: (4) 2-9-003-001 por. & 006 por. and (4) 2-9-001-001 por. This information will be subject to publication which will be submitted to the public for general review.

I have read the summary of the interview and the information is true and accurate to the best of my knowledge. By signing this release form, I am providing my approval for the release of the information to Scientific Consultant Services, Inc., for the purpose outlined above (i.e., making the contents of this interview available for publication to the general public).

Print Name: James Hebard Case

Signature: [Signature]

Release Dated: March 31, 2016
APPENDIX E: CATHERINE AND KARL LO'S CONCERNS
Subject: April 17, 2015: CIA Interviews
From: Karl & Catherine Lo <cp1123@hawaiiantel.net>
Date: Fri, Apr 17, 2015 5:41 pm
To: Cathleen Dagher <cathy@scshawaii.com>
Cc: Beryl Blaich <blaich@aloaha.net>, tony_napua <tony_napua@msn.com>, Ted Kawahinehelelani Blake <tktlake@mac.com>

Aloha, Cathy:

It was a pleasure meeting you today and listening to Teddy Blake and Napua Romo share their personal knowledge on Maha‘ulepu.

We regret that David Chang is ill and couldn’t be at the meeting.

We await to see your notes on today’s sharing.

As to Hawai‘i Dairy Farms at Maha‘ulepu, here are our thoughts:

The dairy should be situated elsewhere away from homes, beaches and resorts.

Our concerns are based on experience, not fear. We remember Waimea Dairy, which in more recent years was owned by Meadow Gold Dairies. From the Westside, Meadow Gold moved to the North Shore and operated a dairy in Moloka‘i until 2000. Unpleasant odors during visits to the Westside and North Shore always assaulted our olfactory organs as we approached and passed the dairies.

Remembrance of the dairies always bring back memories of noxious odors. Cow manure is cow manure! They all have very unpleasant, harmful and poisonous fumes that pollute the environment and the air we breathe and compromise human comfort and well-being. Also, cow manure is breeding ground of bacteria and viruses that can cause disease making public health a concern.

With the dairy located so close to the ocean, it’s hard to convince the community that dairy waste will not create in some way runoff that will pollute Kawaiola Bay. Also, swimming and picnicking at Kawaiola Beach, fishing at Black Mountain, walking along the shore and enjoying a leisurely day at Maha‘ulepu may become the joys of yesteryears with the dairy taking over the valley.

Equally important to us as supporter of Malama Maha‘ulepu is our concern that a dairy at this pristine valley will destroy the natural, cultural and historical heritage for which Maha‘ulepu is appreciated and loved by residents and visitors alike.

Malama Maha‘ulepu’s mission is to take care of Maha‘ulepu, educate the public about it and preserve it for future generations. The question is: Is Hawai‘i Dairy Farms putting an end to this mission?

We hope that our paths will cross again. Until then....

Mahalo nui loa,
K & C

Karl & Catherine Lo
P. O. Box 887
Koloa, HI 96756
(808) 742-7238
cp1123@hawaiiantel.net
Website:
http://www.htcelebration.org/poemswithoutborders

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APPENDIX I

HAWAII DAIRY FARMS AIR EMISSIONS
AND ODOR EVALUATION TECHNICAL REPORT

ARCADIS
Hawaii Dairy Farms

Air Emissions and Odor Evaluation Technical Report

Group 70 International, Inc.

Kauai Dairy
Maha'ulepu, Hawaii

May 4, 2016

Prepared for:
Group 70 International, Inc.

Prepared by:
Arcadis U.S., Inc.
1003 Bishop Street Suite 2000
Honolulu, Hawaii, 96813
Tel 808.522.0321
Fax 808.522.0366

Our Ref.: HI011182.0000

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# Table of Contents

1 Introduction 1

2 Project Site 1

3 Air Dispersion Modeling Methodology 1
   3.1 Model Selection 1
   3.2 Receptors 2
   3.3 Terrain 2
   3.4 Meteorological Data 2
   3.5 Model Control Options 3
   3.6 Emission Sources 3
      3.6.1 Odors 3
         3.6.1.1 Effluent Ponds 3
         3.6.1.2 Irrigation 4
         3.6.1.3 Pasture 4
         3.6.1.4 Slurry 5
         3.6.1.5 Dairy Facility 5
      3.6.2 Fugitive Dust 7
   3.7 Thresholds 7
      3.7.1 Odor 7
      3.7.2 Fugitive Dust 8
   3.8 Results 9
      3.8.1 Odor 9
      3.8.2 Fugitive Dust 9
      3.8.3 Overall 9

4 Annual Emissions from Potential Constituents of Concern 10
   4.1 Emission Sources 10
      4.1.1 Particulate Matter 10


## Table of Contents

4.1.2 Greenhouse Gases 10  
4.2 Emission Factors 10  
4.2.1 Particulate Matter 10  
4.2.2 Greenhouse Gases 10  
4.3 Results 11  
5 References 11  

### Figures

1 Site Location Map  
2 AERMOD Wind Input  
3 Modeled Odor sources  
4 Modeled Particulate Matter Sources  
5 Extent of 6.5 OU/m$^3$ at 99.5$^{th}$ Percentile – Committed Herd Size  
6 Extent of 6.5 OU/m$^3$ at 99.5$^{th}$ Percentile – Committed Herd Size – Close-up  
7 Extent of 6.5 OU/m$^3$ at 99.5$^{th}$ Percentile – Contemplated Herd Size  
8 Extent of 6.5 OU/m$^3$ at 99.5$^{th}$ Percentile – Contemplated Herd Size – Close-up
1 Introduction

Hawaii Dairy Farms LLC (HDF) intends to develop a dairy with up to 2,000 cows in the Maha‘ulepu Valley on the island of Kaua‘i. The project will utilize a pastoral-based rotational grazing system. To demonstrate the sustainability of the dairy, HDF is committed to establishing a herd of 699 cows. HDF will contemplate the possibility of expanding the herd up to 2,000 cows. Both herd sizes are analyzed in this report. This air emissions and odor evaluation report presents the analysis used to determine the potential impacts of odors from both herd sizes and fugitive dust concentrations for the larger contemplated herd size of the proposed dairy facility at off-site receptors. In addition, to evaluate the potential impact of particulate matter (PM) and greenhouse gas (GHG) emissions, the report evaluates the annual emissions from the project for these constituents of concern.

2 Project Site

The project area has historically been used for sugar cane production as part of the Koloa Plantation until the late 1990s when the Koloa Mill closed. Since the mill closed, the project area and its surrounding has been leased to various tenants for ranching and diversified agricultural operations. A small plot of land in the lower center of the valley is currently used for taro lo‘i and will continue to be leased and farmed after the dairy and related pastures are in full operation. Recreational land use such as golf courses and hotels are located approximately 0.9 miles to the south and residential properties are located more than 1.5 miles to the southwest and west. Figure 1 presents a project location map showing the project site and surrounding land use.

The total dairy farm area inclusive of pasture and dairy facility, but excluding the existing taro farm, is 556.8 acres. For the purposes of this evaluation, the dairy project site was divided into two land use areas: Field 1, 547.1 acres of pasture; and Field 2, 9.7 acres containing the dairy facility. Field 1 is broken up into paddocks of approximately 4 to 5 acres in size.

3 Air Dispersion Modeling Methodology

3.1 Model Selection

Computer-based air dispersion models can be used to determine the concentration and frequency of odors and fugitive dust at specific locations around a source using local weather data. The AERMOD modeling system (AERMOD (version 15181) and its pre-processing programs, AERMAP and AERMET) were used for the analysis. AERMOD is a steady-state Gaussian plume model that requires four general types of input data: emission source information, receptor locations, meteorology, and model specific control options.
3.2 Receptors\(^1\)

Fenceline (boundary) receptors and one Cartesian grid of receptors extending out to 4.5 km from the site were used for the modeling analysis. Fenceline receptor spacing was 25 meters while the Cartesian receptor grid spacing is 100 meters between receptors. All receptors were placed at ground level in the model based on standard modeling protocol.

3.3 Terrain

The project site is situated in the Maha‘ulepu Valley on the island of Kaua‘i. The valley is on the leeward side of the Ha‘upu mountain ridge, which runs in the east-west direction, and the valley is also flanked by ridge lines on both sides. Mt. Ha‘upu is the highest point on the ridge line at the back of the valley with an elevation of 2,297 feet. From this point, the ground drops very quickly down to the bottom of the valley to about an elevation of 150 feet. The base of the valley itself is somewhat gradually sloped from an elevation of 150 feet to an elevation of 60 feet along Maha‘ulepu Road on the makai side of the project site near the taro farm.

Terrain elevations were obtained from National Elevation Dataset (NED) digitized terrain data from the United States Geological Survey (USGS), and processed using AERMAP.

3.4 Meteorological Data

One year (2014) of AERMET-ready meteorological data for the project site was obtained from Lakes Environmental. The meteorological data were derived from the NCAR MM5 (5th-generation Mesoscale Model) prognostic meteorological model. The data were used to develop the necessary surface and upper air files for the project's location and modeling domain. These files were used as inputs into the AERMET pre-processing software. The final AERMOD-ready meteorological data file was processed using estimated surface characteristics in the project vicinity with AERMET. The surface characteristics were estimated from available aerial photos for the project location. A wind rose plot of meteorological data is presented in Figure 2. This figure shows that the predominant wind direction is towards the southwest.

\(^1\) Receptors are defined as locations at which odor or particulate concentrations are estimated and do not necessarily denote where a person is located.
3.5 Model Control Options

The analysis included the use of selected model control options that allow the model to be made more site and project specific. These model options include land use classification, incorporation of building wake information, averaging time, and regulatory control options. The modeling used the AERMOD regulatory default option. This option includes elevated terrain algorithms, the effects of stack-tip downwash, missing data routines, and calm wind processing. In addition, rural boundary layer effects were incorporated into the model.

3.6 Emission Sources

3.6.1 Odors

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. Potential sources at the facility would include the effluent ponds, the irrigation system which utilizes effluent, manure from pasture fields, and the dairy buildings. These sources are described in detail in the sections below.

Odor refers to the combined effect of a mixture of gases on the sense of smell. For livestock sources, it may contain hundreds of trace compounds including ammonia (NH₃) and hydrogen sulfide (H₂S). Instead of measuring the individual components of an odor, as is done in standard air concentration modeling, odor concentration is reported in odor units per cubic meter (OU/m³), and odor emissions are reported in units of OU/s (for point sources) and OU/s/m² (for area sources). An odor concentration of 1 OU/m³ is defined as the threshold where the odor of a sample has a 50 percent probability of being perceived by a trained odor specialist.

3.6.1.1 Effluent Ponds

The effluent pond design includes two ponds: a settling pond and storage pond. The settling pond allows for the settlement and accumulation of solids with the overflow of liquid effluent entering the storage pond. The effluent ponds are open to the atmosphere. The top of the settling pond is 87 feet by 133 feet with a total depth of 17 feet with side slopes not steeper than 2 horizontal to 1 vertical. Effluent from the settling pond overflows through overflow pipes and into the storage pond. The top of the storage pond is 215 feet by 133 feet with a total depth of 17 feet. However, it is not likely the effluents would reach the top of the ponds as it is designed for a 25-year flood level. Based on a normal 30-day period of rain and effluent storage, the settling pond would be 12 feet deep and the storage pond would be 10.75 deep. The corresponding widths and lengths are 67 feet by 113 feet and 190 feet by 108 feet for the settling pond and storage pond, respectively. The effluent ponds were modeled at ground level.
Each pond was modeled in AERMOD as an area source with dimensions of the anticipated 30-day period of rain and effluent storage effluent surface. Odor emission rates were taken from Feitz 2002 (Dairy Australia, December 2008) which measured 30 ponds over 12 months in Australia. These results were selected over other data presented in Dairy Australia (2008) as it was measured using a wind tunnel apparatus as opposed to isolation flux hoods. According to Dairy Australia, most research shows that isolation flux hoods under-predict odor emissions relative to wind tunnels.

3.6.1.2 Irrigation

Odors from the irrigation process will be based on the odors volatilizing from effluent water mixed with irrigation water. This water will be applied through two center pivots and released approximately one meter from the ground surface. Irrigation droplets are typically large (200 µm or larger) in order to prevent droplets from evaporating before hitting the ground (Hardy et al., 2006). These larger sized aerosols also limit the physical dispersion of the water droplets used in the center pivot. Therefore, the evaluation of the irrigation droplets as particulates is not considered. Irrigation pivot #1 will be a full circle pivot and irrigation pivot #2 will be a ¾-circle pivot. The ¼ circle not reached by irrigation pivot #2 will receive water through a hard-hose gun irrigation system.

The odor emissions associated with the effluent ponds were reduced by a factor of 12 to account for dilution of the effluent for irrigation. The diluted effluent will be quickly absorbed into the ground and the odor will be short-lived. Therefore, the area covered in an hour (1/40 of a complete rotation) was modeled as an area emission source. As a worst case scenario, the section closest to the southern boundary was used in this evaluation.

3.6.1.3 Pasture

The cows will be maintained in six mobs of animals. At the committed herd size of 699 cows, mobs will contain up to 115 animals and for the contemplated herd size of up to 2,000 cows, mobs will contain up to 334 animals. The cows graze for one day per paddock and will produce the majority of the manure in that one paddock as they graze. Each mob will graze in a separate paddocks of 27 to 81 acres, and
adjacent to paddocks with other mobs. Paddock blocks that would be occupied on a given day were selected based on a typical scenario and were modeled as an area source.

Odor emission rates were based on a study by Topper et al. (2008) which evaluated odors from manure of dairy heifers. Various diets were evaluated in the Topper et al. (2008) study. The odor emissions used for this odor evaluation was for high concentrate (HC) and 20% corn silage. Although this diet does not necessarily coincide with the project (pasture fed cows were not evaluated in Topper et al., 2008), the HC; 20% silage resulted in the highest percentage of urine in the manure which is consistent with the anticipated manure. The samples used in the Topper et al study were 200 grams in weight placed in a 3.8-liter glass jar. The odor emission rate used in this report was adjusted from the sample size used in Topper et al. (2008) (Appendix A).

3.6.1.4 Slurry

Solids collected from the settling pond will be applied on designated areas through a “gun type” application system to areas outside the liquid effluent application. The slurry consists of three components; 1) liquid effluent, 2) settled solids from the liquid effluent, and 3) irrigation/collected rain water. The settled solids will be mixed with liquid (effluent or irrigation and/or collected rain water) to create a solids suspension slurry, which can then be pumped to the hydrants. The ratio of liquid to solids will be 20:1 (mixing volume to solids volume). Since the liquid will consist of either effluent or irrigation/collected rain water, it is conservatively assumed that all the liquid will be effluent. The slurry will be pumped through underground pipes to hydrants which have a “gun sprinkler” with a 65 foot radius. The planned location of the application (the “sludge delivery area”) is anticipated to be on the east portion of the site between the area that is covered by the irrigation two center pivots for the committed herd size of 699 cows and anywhere within the site. As a worst case scenario for the contemplated herd size of up to 2,000 cows, the section closest to the southern boundary not occupied by cows (since sludge is not applied to occupied areas) was used in this evaluation.

The odor emissions associated with the slurry were based on undiluted effluent and pasture manure, described in Sections 3.6.1.2 and 3.6.1.3 in a ratio of 20:1 effluent to manure. An area covering a circle with a 65-foot radius, consistent with the gun sprinkler reach was modeled with a ground level release height.

3.6.1.5 Dairy Facility

The dairy facility is contained within an approximately 10-acre area in Field 2. The corresponding building areas are under 0.1% of the total farm area. The dairy buildings include the milking parlor, an implement shed, and calf sheds. The milking parlor contains an automated 60-stall rotary which is approximately 256 feet by 88.5 feet by 33 feet tall. Two open bay calf sheds will be constructed to provide safe housing
to newly born calves. Each shed will be approximately 81 feet by 26 feet by 15 feet tall. The feeding area will be washed daily and the wastewater transferred to the effluent ponds.

Dairy facility odor emissions were modeled as area sources with dimensions of the building footprint. Emission rates consistent with free stall dairy buildings from Jacobson et al. (2001) were used.

Table 1 summarizes the emission fluxes used in the evaluation and the area of the emission source. The emission flux estimates are detailed in Appendix A.

Table 1. Hawaii Dairy Farms Odor Modeling Parameters

<table>
<thead>
<tr>
<th>Location</th>
<th>Source</th>
<th>Emission Flux (OU / s / m²)</th>
<th>Area (ft²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effluent Ponds</td>
<td>Settling Pond</td>
<td>8.1</td>
<td>7,571</td>
</tr>
<tr>
<td></td>
<td>Storage Pond</td>
<td>8.1</td>
<td>20,520</td>
</tr>
<tr>
<td>Irrigation</td>
<td>Effluent</td>
<td>0.675</td>
<td>222,828</td>
</tr>
<tr>
<td>Pasture</td>
<td>699 Herd</td>
<td>0.13</td>
<td>1,217,078</td>
</tr>
<tr>
<td></td>
<td>2,000 Herd</td>
<td>0.37</td>
<td>1,217,078</td>
</tr>
<tr>
<td>Nutrient Application</td>
<td>Slurry</td>
<td>8.0</td>
<td>13,273</td>
</tr>
<tr>
<td>Dairy Facility</td>
<td>Bay Calf Shed #1</td>
<td>1.84</td>
<td>2,106</td>
</tr>
<tr>
<td></td>
<td>Bay Calf Shed #2</td>
<td>1.84</td>
<td>2,106</td>
</tr>
<tr>
<td></td>
<td>Milking Parlor</td>
<td>1.84</td>
<td>22,656</td>
</tr>
</tbody>
</table>

Notes:
All sources were modeled as area sources with a ground level release (i.e., release height = 0) with the exception of irrigation which was modeled with a release height of 1 meter (the height of the effluent water from the center pivots).
3.6.2 Fugitive Dust

Fugitive dust emissions, measured as particulate matter (PM), are generated from the movement of cows along the walkways and races that connect the paddocks together and provide access to and from the dairy facility. The cow races allow twice daily movement of the cows from the paddocks to the Milking Parlor and are not irrigated. Figure 4 shows the cow walkways and races. Emission rates, in mass of PM per time, were estimated using USEPA AP-42 emission factors. These emission factors were developed from literature sources from a number of dairy farm sources including scrape freestall barns, drylots, liquid manure land application activities, and solids storage. The only source with measurable PM emissions was from drylots. Drylots are confined areas where animals are walking over dirt and dried manure throughout the day. In the project scenario, cow movement along the walkways and races would occur for brief periods of time during the day. Therefore, use of the PM emission factor from AP-42 will overestimate PM emissions associated with cow movement along the cow walkways and races.

Calculated emission rates were then used in the AERMOD model to estimate downwind concentrations in micrograms per cubic meter (µg/m³). Emissions were evenly distributed throughout the cow walkways and races and assumed to occur between the hours of 6 am and 9 pm. Figures 3 and 4 show the locations of the modeled odor emission sources and particulate matter sources, respectively.

3.7 Thresholds

3.7.1 Odor

The development of a target odor criteria is complicated by the difficulties in odor sampling and measurement combined with a lack of suitable data on odor levels associated with annoyance and complaint. Mahin (2003) presented regulatory off-site limits based on levels predicted by dispersion modeling in the U.S. range from 1 OU/m³ to 50 OU/m³ for a variety of averaging times.

<table>
<thead>
<tr>
<th>Table 2. Regulatory Odor Thresholds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
</tr>
<tr>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Allegheny County Wastewater Treatment Plant (WWTP)</td>
</tr>
<tr>
<td>San Francisco Bay Area Air Quality District</td>
</tr>
</tbody>
</table>

3 As discussed in Section 3.6.1.2, irrigation droplets are typically large (200 µm or larger) and are therefore not included in PM₁₀ (particulate matter 10 µm or less) and PM₂.₅ (particulate matter 2.₅ µm or less) analyses.
Many of these values are for wastewater treatment plant or composting facilities, but none of the regulatory standards are specific to dairy farms. However, an Australian study by Wang and Feitz (2004) suggested 6.5 OU/m³, 1-hour averaging and 99.5th percentile at receptor as appropriate criteria for the assessment of dairy farm odors. Based on the source of the odor, this odor threshold was selected for this analysis. These criteria represent the extent of the 6.5 OU/m³ level that could be expected to be reached only 0.5% of the time (1 – 99.5%), or once per 200 hours, or 44 hours per year. In other words, 99.5% of the time the odor threshold of 6.5 OU/m³ is less than the extent shown, and only 0.5% of the time is it at or beyond the extent shown.

3.7.2 Fugitive Dust

Fugitive dust was modeled as PM₁₀ (respirable dust particles of less than 10 microns) and PM₂.₅ (fine dust particles less than 2.5 microns). Modeled PM₁₀ and PM₂.₅ concentrations were added to background concentrations and compared to State and Federal ambient air concentration standards. The standards are presented in Table 3.

Table 3. Air Quality Standards Attainment Status for Hawaii

<table>
<thead>
<tr>
<th>Parameter</th>
<th>State Standard</th>
<th>Federal Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particulate Matter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(PM₁₀)</td>
<td>24-Hour</td>
<td>150 µg/m³</td>
</tr>
<tr>
<td></td>
<td>Annual Arithmetic Mean</td>
<td>50 µg/m³</td>
</tr>
<tr>
<td>Particulate Matter – Fine</td>
<td>24-Hour</td>
<td>--</td>
</tr>
<tr>
<td>(PM₂.₅)</td>
<td>Annual Arithmetic Mean</td>
<td>--</td>
</tr>
</tbody>
</table>
3.8 Results

3.8.1 Odor

Odor isopleths were created using the results of AERMOD modeling. The odor modeling analysis and isopleths indicate that the 99.5th percentile of 6.5 OU/m$^3$ odor threshold extend beyond the dairy farm boundary, however it does not reach recreational nor residential areas. Figures 5 and 7 illustrate the extent of the odors for both herd sizes, respectively. Figures 6 and 8 show close-up views of the same odor extents. It should be noted that the parameters used in this analysis were intentionally very conservative and the impacts shown depend on an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location; thus, actual offsite odor impacts are likely to be much lower and/or less frequent than shown.

3.8.2 Fugitive Dust

Fugitive dust concentrations from the contemplated herd size were estimated using the results of AERMOD modeling. The fugitive dust concentration from the dairy farm was added to the background concentration and compared to the state ambient air quality standards. All of these concentrations were less than the applicable state and federal standards. Because of the relatively low impact even at the contemplated herd size, fugitive dust modeling was not conducted for the committed herd size.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Average Time</th>
<th>Concentration (µg/m$^3$)</th>
<th>Background</th>
<th>Total Impact</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM$_{10}$</td>
<td>24 hr</td>
<td>2.01</td>
<td>39 µg/m$^3$</td>
<td>41.01 µg/m$^3$</td>
<td>150 µg/m$^3$</td>
</tr>
<tr>
<td>PM$_{10}$</td>
<td>annual</td>
<td>0.33</td>
<td>15 µg/m$^3$</td>
<td>14.83 µg/m$^3$</td>
<td>50 µg/m$^3$</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>24 hr</td>
<td>0.23</td>
<td>12 µg/m$^3$</td>
<td>12.23 µg/m$^3$</td>
<td>35 µg/m$^3$</td>
</tr>
<tr>
<td>PM$_{2.5}$</td>
<td>annual</td>
<td>0.04</td>
<td>3.9 µg/m$^3$</td>
<td>3.94 µg/m$^3$</td>
<td>15 µg/m$^3$</td>
</tr>
</tbody>
</table>

3.8.3 Overall

Based on the air dispersion modeling conducted for both committed and contemplated herd sizes development, neither the odor nor fugitive dust emissions from the dairy farm would exceed applicable thresholds. In addition, aerosols from irrigation water would not extend across the facility boundary.
4 Annual Emissions from Potential Constituents of Concern

In addition to modeling concentrations of odors and particulate matter (PM), total annual emissions (in tons per year) were estimated for PM and greenhouse gases (GHGs). Total annual emissions are typically estimated for potential Hawaii Department of Health (DOH) Clean Air Branch (CAB) permitting applicability. The minimum annual emission threshold for regulated pollutants emitted from regulated sources are given in Hawaii Administrative Rules (HAR) Chapter 11-60.1. For GHGs, the threshold is 3,500 tons per year, and for PM is 2 tons per year. However, for the dairy project, the sources of GHGs and PM (enteric fermentation by cattle, manure application, and fugitive dust from cattle raceways) are not considered regulated sources by CAB standards. Therefore, total annual emissions are estimated only for comparison purposes.

4.1 Emission Sources

4.1.1 Particulate Matter

Fugitive dust emissions, measured as PM, are generated from the movement of cows along the walkways and races that connect the paddocks together and provide access to and from the dairy facility.

4.1.2 Greenhouse Gases

Dairy cows can result in methane (CH$_4$) emissions from enteric fermentation and both CH$_4$ and nitrous oxide (N$_2$O) emissions from manure application. Manure application includes direct deposition from cows and application of slurry and irrigation water containing manure.

4.2 Emission Factors

4.2.1 Particulate Matter

Emission rates, in mass of PM per time, were estimated using USEPA AP-42 emission factors from the Emissions from Animal Feeding Operations Report. A PM emission rate of 2.3 pounds per year per “animal unit” (where 1 cow equals 0.7 animal units [AU]), was obtained for dairy cattle from drylots. Specific parameters are presented in the attached Table A-3.

4.2.2 Greenhouse Gases

GHG emission rates were calculated using IPCC’s Guidelines for National Greenhouse Gas Inventories (IPCC 2006). Specific parameters were selected for Oceanic dairy cattle in warm climates to most accurately represent conditions at the Hawaii Dairy Farms. CH$_4$ and N$_2$O emissions were converted to
carbon dioxide equivalents (CO$_2$e) using the IPCC’s AR4 global warming potential (GWP) that relates the GHG to CO$_2$. Specific parameters are presented in the attached Tables A-4 to A5.

4.3 Results

For the committed and contemplated herd sizes, GHG emissions were estimated to be 2,693 and 7,705 CO$_2$e metric tons per year, respectively. The total annual PM for the committed and contemplated herd sizes is 0.6 and 3.3 tons per year. Detailed calculations are provided in Appendix A.

5 References


WIND ROSE PLOT:
MM5 2014 Met data

COMMENTS:
COMPANY NAME:
MODELER:
DATE: 5/23/2015
PROJECT NO.: 70 N

DATA PERIOD:
Start Date: 1/1/2014 - 00:00
End Date: 12/31/2014 - 23:00

WIND SPEED (m/s):
- >= 11.10
- 8.80 - 11.10
- 5.70 - 8.80
- 3.60 - 5.70
- 2.10 - 3.60
- 0.50 - 2.10
- Calms: 0.98%

TOTAL COUNT: 8760 hrs.

AVG. WIND SPEED: 4.64 m/s

WRPLOT View - Lakes Environmental Software

Group 70 International, Inc.
AERMOD Wind Input

ARCADIS | Design & Consultancy for natural and built assets
FIGURE 3

Group 70 International, Inc.

Modeled Odor Sources
Exceedances of 6.5 OU/m³ (0.5% = 99.5th Percentile)

Extent of 6.5 OU/m³ at 99.5th Percentile - Committed Herd Size (699 Cows)
Exceedances of 6.5 OU/m\(^3\) (0.5\% = 99.5th Percentile)
Exceedances of 6.5 OU/m³ (0.5% = 99.5th Percentile)
Exceedances of 6.5 OU/m³ (0.5% = 99.5th Percentile)
Appendix A
<table>
<thead>
<tr>
<th>Source</th>
<th>Odor Emission Flux (OU/m²/s)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Settling Pond</td>
<td>8.1</td>
<td>Feitz 2002</td>
</tr>
<tr>
<td>Storage Pond</td>
<td>8.1</td>
<td>Feitz 2002</td>
</tr>
<tr>
<td>Pivot irrigation</td>
<td>0.675</td>
<td>Storage pond effluent diluted by a factor of 12</td>
</tr>
<tr>
<td>Drip irrigation</td>
<td>0</td>
<td>Subsurface unlikely to result in significant odors</td>
</tr>
<tr>
<td>Pasture - Phase 1</td>
<td>0.13</td>
<td>Derived from Topper et al (see Table 2)</td>
</tr>
<tr>
<td>Pasture - Phase 2</td>
<td>0.37</td>
<td>Derived from Topper et al (see Table 2)</td>
</tr>
<tr>
<td>Slurry</td>
<td>8.0</td>
<td>1:20 ratio of solids (manure) to effluent (storage pond)</td>
</tr>
<tr>
<td>Bay Calf Sheds</td>
<td>1.84</td>
<td>Jacobson et al 2001</td>
</tr>
<tr>
<td>Milking Parlor</td>
<td>1.84</td>
<td>Jacobson et al 2001</td>
</tr>
</tbody>
</table>
TABLE A-2  
Pasture Manure Emission Flux Estimates  
Hawaii Dairy Farms

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Topper Study</th>
</tr>
</thead>
<tbody>
<tr>
<td># Cows</td>
<td>699</td>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>Daily rate (lbs/day)</td>
<td>143</td>
<td>143</td>
<td></td>
</tr>
<tr>
<td>Weight (lbs)</td>
<td>8.8</td>
<td>8.8</td>
<td>0.44</td>
</tr>
<tr>
<td>Mass (g)</td>
<td>3,995</td>
<td>3,995</td>
<td>200</td>
</tr>
<tr>
<td>Volume (gal)</td>
<td>1.05</td>
<td>1.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Volume (m³)</td>
<td>0.004</td>
<td>0.004</td>
<td>0.0002</td>
</tr>
<tr>
<td>Area of Emission (m²)¹</td>
<td>2,257</td>
<td>6,458</td>
<td>0.01</td>
</tr>
<tr>
<td>Field area (m²)</td>
<td>113,073</td>
<td>113,073</td>
<td></td>
</tr>
<tr>
<td>Odor (OU/m²/s)²</td>
<td></td>
<td></td>
<td>6.55</td>
</tr>
<tr>
<td>Adjusted Odor</td>
<td>0.13</td>
<td>0.37</td>
<td></td>
</tr>
</tbody>
</table>

Notes:

1 Assumes manure in the Topper et al 2008 study has a 2 cm height.
2 From Topper et al 2008 for a heifer fed a high concentrate diet and 20% silage.
### TABLE A-3
Annual PM Emissions
Hawaii Dairy Farms

<table>
<thead>
<tr>
<th>Parameters</th>
<th>699 Cow Herd</th>
<th>2,000 Cow Herd</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emission Factor</td>
<td>2.3</td>
<td></td>
<td>lb/yr/AU</td>
</tr>
<tr>
<td>Dairy Cattle AU</td>
<td>0.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td># Cattle</td>
<td>699</td>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>PM Emissions</td>
<td>1,125</td>
<td>6,571</td>
<td>lb/yr</td>
</tr>
<tr>
<td></td>
<td>0.6</td>
<td>3.3</td>
<td>tons/yr</td>
</tr>
</tbody>
</table>

Notes:
Emission factor and animal unit (AU) from USEPA AP-42.
AU = Animal unit
<table>
<thead>
<tr>
<th>GHG</th>
<th>Annual Emissions</th>
<th>CO₂ equivalent Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>kg/yr</td>
<td>MT/yr</td>
</tr>
<tr>
<td>Methane (CH₄)</td>
<td>84579</td>
<td>85</td>
</tr>
<tr>
<td>Nitrous oxide (N₂O)</td>
<td>1940</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes
GWP from IPCC 2007 AR4
## Facility Information

- **550 kg/cattle**
- **699 Cattle**

<table>
<thead>
<tr>
<th>Value</th>
<th>Unit</th>
<th>Parameter</th>
<th>Source</th>
<th>Table</th>
<th>Table Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 kg</td>
<td>CH4/head/yr</td>
<td>Oceania, Dairy Cattle</td>
<td>IPCC 2006</td>
<td>Table 10.11</td>
<td>Tier 1 Enteric Fermentation Emission Factors for Cattle</td>
</tr>
<tr>
<td>31 kg</td>
<td>CH4/head/yr</td>
<td>Oceania, Dairy Cattle, Warm Climate</td>
<td>IPCC 2006</td>
<td>Table 10.14</td>
<td>Manure Management Methane Emission Factors by Temperature for Cattle, Swine, and Buffalo</td>
</tr>
<tr>
<td>0.44 kg</td>
<td>N/1000kg/day</td>
<td>Oceania, Dairy Cattle</td>
<td>IPCC 2006</td>
<td>Table 10.19</td>
<td>Default values for nitrogen excretion rate</td>
</tr>
<tr>
<td>0.02 kg</td>
<td>N2O-N/kg N</td>
<td>Cattle</td>
<td>IPCC 2006</td>
<td>Table 11.1</td>
<td>Default Emission factors to Estimate Direct N2O from Managed Soils</td>
</tr>
<tr>
<td>Emission Source</td>
<td>Emission Factor</td>
<td>Number of Dairy Cattle</td>
<td>Emissions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------------</td>
<td>------------------------</td>
<td>---------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enteric Fermentation</td>
<td>90</td>
<td>699</td>
<td>0.06291</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manure Management</td>
<td>31</td>
<td>699</td>
<td>0.021669</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$84579 \text{ kg CH}_4/\text{yr}$

**Equation 10.19**

**Enteric fermentation emissions from a livestock category**

$$Emissions = EF(T) \cdot \left( \frac{N(T)}{10^5} \right)$$

Where:

- $Emissions =$ methane emissions from Enteric Fermentation, Gg CH$_4$ yr$^{-1}$
- $EF(T) =$ emission factor for the defined livestock population, kg CH$_4$ head$^{-1}$ yr$^{-1}$
- $N(T) =$ the number of head of livestock species / category $T$ in the country
- $T =$ species/category of livestock

**Equation 10.12**

**CH$_4$ emissions from manure management**

$$CH_4_{\text{manure}} = \sum_{(T)} \left( \frac{EF(T) \cdot N(T)}{10^6} \right)$$

Where:

- $CH_4_{\text{manure}} =$ CH$_4$ emissions from manure management, for a defined population, Gg CH$_4$ yr$^{-1}$
- $EF(T) =$ emission factor for the defined livestock population, kg CH$_4$ head$^{-1}$ yr$^{-1}$
- $N(T) =$ the number of head of livestock species / category $T$ in the country
- $T =$ species/category of livestock
<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>NT</td>
<td>Number of Dairy Cattle</td>
<td>699</td>
<td></td>
</tr>
<tr>
<td>Nrate</td>
<td>N excretion per cattle</td>
<td>0.44 kg</td>
<td>N/1000 kg/day</td>
</tr>
<tr>
<td>TAM</td>
<td></td>
<td>550</td>
<td></td>
</tr>
<tr>
<td>NexT</td>
<td>N excretion per cattle</td>
<td>88.33</td>
<td></td>
</tr>
<tr>
<td>MS</td>
<td>Fraction excreted in pasture</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>FPRP</td>
<td>Manure deposited</td>
<td>61742.7 kg</td>
<td>N/yr</td>
</tr>
<tr>
<td>EF3PRP</td>
<td>Emission Factor</td>
<td>0.02 kg</td>
<td>N2O-N / (kg N)</td>
</tr>
<tr>
<td>N2O-NPRP</td>
<td>N2O-N emissions</td>
<td>1234.85 kg</td>
<td>N2O-N / (kg N input)</td>
</tr>
<tr>
<td></td>
<td>Annual Emissions</td>
<td>1940.48 kg</td>
<td>N2O/yr</td>
</tr>
</tbody>
</table>

**Equation 11.1**

**DIRECT N2O EMISSIONS FROM MANAGED SOILS (TIER 1)**

\[
N_{2O_{Direct}} = N_{2O-N_{input}} + N_{2O-N_{OS}} + N_{2O-N_{PRP}}
\]

Where:

\[
N_{2O-N_{input}} = \left[ \left( F_{IN} + F_{DN} + F_{CR} + F_{OM} \right) \cdot EF \right]
\]

\[
N_{2O-N_{OS}} = \left( F_{OS\_CG\_Temp} \cdot EF_{CG\_Temp} \right) \left( F_{OS\_F\_Temp\_NR} \cdot EF_{F\_Temp\_NR} \right)
\]

\[
N_{2O-N_{PRP}} = \left( F_{PRP\_CPP} \cdot EF_{PRP\_CPP} \right) \left( F_{PRP\_SO} \cdot EF_{PRP\_SO} \right)
\]

Where:

- \(N_{2O_{Direct}}\) = annual direct \(N_2O-N\) emissions produced from managed soils, \(kg\ N_2O-N\ yr^{-1}\)
- \(N_{2O-N_{input}}\) = annual direct \(N_2O-N\) emissions from inputs to managed soils, \(kg\ N_2O-N\ yr^{-1}\)
- \(N_{2O-N_{OS}}\) = annual direct \(N_2O-N\) emissions from managed organic soils, \(kg\ N_2O-N\ yr^{-1}\)
- \(N_{2O-N_{PRP}}\) = annual direct \(N_2O-N\) emissions from urea and dung inputs to grazed soils, \(kg\ N_2O-N\ yr^{-1}\)
- \(F_{IN}\) = annual amount of synthetic fertilizer N applied to soils, \(kg\ N\ yr^{-1}\)
- \(F_{DN}\) = annual amount of animal manure, compost, sewage sludge and other organic N additions applied to soils (Note: If including sewage sludge, cross-check with Waste Sector to ensure there is no double counting of \(N_2O-N\) emissions from the N in sewage sludge), \(kg\ N\ yr^{-1}\)
- \(F_{CR}\) = annual amount of N in crop residues (above-ground and below-ground), including N-fixing crops, and from forage/pasture renewal, returned to soils, \(kg\ N\ yr^{-1}\)
- \(F_{OM}\) = annual amount of N in mineral soils that is mineralised, in association with loss of soil C from soil organic matter as a result of changes to land use or management, \(kg\ N\ yr^{-1}\)
- \(F_{OS}\) = annual area of managed/drained organic soils, ha (Note: the subscripts CG, F, Temp, Trop, NR and NP refer to Cropland and Grassland, Forest Land, Temperate, Tropical, Nutrient Rich, and Nutrient Poor, respectively)
- \(F_{PRP}\) = annual amount of urea and dung N deposited by grazing animals on pasture, range and paddock, \(kg\ N\ yr^{-1}\) (Note: the subscripts CPP and SO refer to Cattle, Poultry and Figs, and Sheep and Other animals, respectively)
- \(EF_{IN}\) = emission factor for \(N_2O-N\) emissions from N inputs, \(kg\ N_2O-N / (kg\ N\ input)^{1}\) (Table 11.1)
- \(EF_{PRP}\) = emission factor for \(N_2O-N\) emissions from N inputs to flooded rice, \(kg\ N_2O-N / (kg\ N\ input)^{1}\) (Table 11.1)
- \(EF_{OS}\) = emission factor for \(N_2O-N\) emissions from drained/managed organic soils, \(kg\ N_2O-N / ha^{-1}\ yr^{-1}\) (Table 11.1) (Note: the subscripts CG, F, Temp, Trop, NR and NP refer to Cropland and Grassland, Forest Land, Temperate, Tropical, Nutrient Rich, and Nutrient Poor, respectively)
- \(EF_{PRP}\) = emission factor for \(N_2O-N\) emissions from urine and dung N deposited on pasture, range and paddock by grazing animals, \(kg\ N_2O-N / (kg\ N\ input)^{1}\) (Table 11.1) (Note: the subscripts CPP and SO refer to Cattle, Poultry and Figs, and Sheep and Other animals, respectively)
**Equation 11.5**

**N in urine and dung deposited by grazing animals on pasture, range and paddock (Tier 1)**

\[ F_{PRP} = \sum_{T} \left( N_{T} \cdot N_{e}(T) \cdot MS_{T,PPP} \right) \]

Where:

- \( F_{PRP} \) = annual amount of urine and dung N deposited on pasture, range, paddock and by grazing animals, kg N yr\(^{-1}\)
- \( N_{T} \) = number of head of livestock species/category \( T \) in the country (see Chapter 10, Section 10.2)
- \( N_{e}(T) \) = annual average N excretion per head of species/category \( T \) in the country, kg N animal\(^{-1}\) yr\(^{-1}\) (see Chapter 10, Section 10.5)
- \( MS_{T,PPP} \) = fraction of total annual N excretion for each livestock species/category \( T \) that is deposited on pasture, range and paddock\(^{12}\) (see Chapter 10, Section 10.5)

**Equation 10.20**

**Annual N excretion rates**

\[ N_{e}(T) = N_{e}(T) \cdot \frac{TAM}{1000} \cdot \frac{365}{TAM} \]

Where:

- \( N_{e}(T) \) = annual N excretion for livestock category \( T \), kg N animal\(^{-1}\) yr\(^{-1}\)
- \( N_{e}(T) \) = default N excretion rate, kg N (1000 kg animal mass\(^{-1}\)) day\(^{-1}\) (see Table 10.19)
- TAM\(_{T}\) = typical animal mass for livestock category \( T \), kg animal\(^{2}\)

\[ N_{2}O = N_{2}O-N \cdot \frac{44}{28} \]
## Table A-5

**Phase 2 GHG Emissions**  
**Hawaii Dairy Farms**

<table>
<thead>
<tr>
<th>GHG</th>
<th>Annual Emissions</th>
<th>CO₂ equivalent Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>kg/yr MT/yr GWP</td>
<td>CO₂e MT/yr</td>
</tr>
<tr>
<td>Methane (CH₄)</td>
<td>242000 242 25</td>
<td>6050</td>
</tr>
<tr>
<td>Nitrous oxide (N₂O)</td>
<td>5552 6 298</td>
<td>1655</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>7705</strong></td>
</tr>
</tbody>
</table>

**Notes**  
GWP from IPCC 2007 AR4
<table>
<thead>
<tr>
<th>Value</th>
<th>Unit</th>
<th>Parameter</th>
<th>Source</th>
<th>Table</th>
<th>Table Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>kg CH4/head/yr</td>
<td>Oceania, Dairy Cattle</td>
<td>IPCC 2006</td>
<td>Table 10.11</td>
<td>Tier 1 Enteric Fermentation Emisison Factors for Cattle</td>
</tr>
<tr>
<td>31</td>
<td>kg CH4/head/yr</td>
<td>Oceania, Dairy Cattle, Warm Climate</td>
<td>IPCC 2006</td>
<td>Table 10.14</td>
<td>Manure Management Methane Emission Factors by Temperature for Cattle, Swine, and Buffalo</td>
</tr>
<tr>
<td>0.44</td>
<td>kg N/1000kg/day</td>
<td>Oceania, Dairy Cattle</td>
<td>IPCC 2006</td>
<td>Table 10.19</td>
<td>Default values for nitrogen excretion rate</td>
</tr>
<tr>
<td>0.02</td>
<td>kg N2O-N/kg N</td>
<td>Cattle</td>
<td>IPCC 2006</td>
<td>Table 11.1</td>
<td>Default Emisison factors to Estimate Direct N2O from Managed Soils</td>
</tr>
</tbody>
</table>
### Emission Factor Number of Dairy Cattle Emissions

<table>
<thead>
<tr>
<th>Emission Source</th>
<th>Number of Dairy Cattle</th>
<th>Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enteric Fermentation</td>
<td>90</td>
<td>2000</td>
</tr>
<tr>
<td>Manure Management</td>
<td>31</td>
<td>2000</td>
</tr>
</tbody>
</table>

242000 kg CH₄/yr

---

**Equation 10.19**

**ENTERIC FERMENTATION EMISSIONS FROM A LIVESTOCK CATEGORY**

\[
\text{Emissions} = EF_{iT} \cdot \left( \frac{N_{iT}}{10^6} \right)
\]

Where:
- Emissions = methane emissions from Enteric Fermentation, Gg CH₄ yr⁻¹
- \( EF_{iT} \) = emission factor for the defined livestock population, kg CH₄ head⁻¹ yr⁻¹
- \( N_{iT} \) = the number of head of livestock species / category T in the country
- T = species/category of livestock

**Equation 10.22**

**CH₄ EMISSIONS FROM MANURE MANAGEMENT**

\[
CH₄\text{Manure} = \sum_{T} \left( \frac{EF_{iT} \cdot N_{iT}}{10^6} \right)
\]

Where:
- \( CH₄\text{Manure} \) = CH₄ emissions from manure management, for a defined population, Gg CH₄ yr⁻¹
- \( EF_{iT} \) = emission factor for the defined livestock population, kg CH₄ head⁻¹ yr⁻¹
- \( N_{iT} \) = the number of head of livestock species/category T in the country
- T = species/category of livestock
<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Value</th>
<th>Unit</th>
</tr>
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<tr>
<td>NT</td>
<td>Number of Dairy Cattle</td>
<td>2000</td>
<td></td>
</tr>
<tr>
<td>Nrate</td>
<td>N excretion per cattle</td>
<td>0.44</td>
<td>kg N/1000kg/day</td>
</tr>
<tr>
<td>TAM</td>
<td></td>
<td>550</td>
<td></td>
</tr>
<tr>
<td>NexT</td>
<td>N excretion per cattle</td>
<td>88.33</td>
<td></td>
</tr>
<tr>
<td>MS</td>
<td>Fraction excreted in pasture</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>FPRP</td>
<td>Manure deposited</td>
<td>176660</td>
<td>kg N/yr</td>
</tr>
<tr>
<td>EF3PRP</td>
<td>Emission Factor</td>
<td>0.02</td>
<td>kg N2O-N / kg N</td>
</tr>
<tr>
<td>N2O-NPRP</td>
<td>N2O-N emissions</td>
<td>3533.2</td>
<td>kg N2O-N / kg N input</td>
</tr>
<tr>
<td></td>
<td><strong>Annual Emissions</strong></td>
<td><strong>5552.17</strong></td>
<td>kg N2O/yr</td>
</tr>
</tbody>
</table>

**EQUATION 11.1**

**DIRECT N₂O EMISSIONS FROM MANAGED SOILS (TIER 1)**

\[
N₂O_{Direct} = N₂O_{N\text{-input}} + N₂O_{OSS} + N₂O_{FPRP}
\]

Where:

\[
N₂O_{N\text{-input}} = \left( \left( F_{SN} + F_{OS} + F_{CR} + F_{SM} \right) \times EF \right) + \left( F_{SN} + F_{OS} + F_{CR} + F_{SM} \times FR \right) \times EF_{FR}
\]

\[
N₂O_{OSS} = \left( F_{OSS, Temp} \times EF_{OSS, Temp} \right) + \left( F_{OSS, Temp, NR} \times EF_{OSS, Temp, NR} \right) + \left( F_{OSS, Temp, NP} \times EF_{OSS, Temp, NP} \right)
\]

\[
N₂O_{FPRP} = \left( F_{FPRP, Temp} \times EF_{FPRP, Temp} \right) + \left( F_{FPRP, SO} \times EF_{FPRP, SO} \right)
\]

Where:

- \( N₂O_{Direct} \) = annual direct N₂O-N emissions produced from managed soils, kg N₂O-N yr⁻¹
- \( N₂O_{N\text{-input}} \) = annual direct N₂O-N emissions from N inputs to managed soils, kg N₂O-N yr⁻¹
- \( N₂O_{OSS} \) = annual direct N₂O-N emissions from managed organic soils, kg N₂O-N yr⁻¹
- \( N₂O_{FPRP} \) = annual direct N₂O-N emissions from urine and dung inputs to grazed soils, kg N₂O-N yr⁻¹
- \( F_{SN} \) = annual amount of synthetic fertiliser N applied to soils, kg N yr⁻¹
- \( F_{OS} \) = annual amount of animal manure, compost, sewage sludge and other organic N additions applied to soils (Note: If including sewage sludge, cross-check with Waste Sector to ensure there is no double counting of N₂O emissions from the N in sewage sludge), kg N yr⁻¹
- \( F_{CR} \) = annual amount of N in crop residues (above-ground and below-ground), including N-fixing crops, and from forage/pasture renewal, returned to soils, kg N yr⁻¹
- \( F_{SM} \) = annual amount of N in mineral soils that is mineralised, in association with loss of soil C from soil organic matter as a result of changes to land use or management, kg N yr⁻¹
- \( F_{OSS} \) = annual area of managed/dried organic soils, ha (Note: the subscripts CG, F, Temp, Trop, NR and NP refer to Cropland and Grassland, Forest Land, Temperate, Tropical, Nutrient Rich, and Nutrient Poor, respectively)
- \( F_{FPRP} \) = annual amount of urine and dung N deposited by grazing animals on pasture, range and paddock, kg N yr⁻¹ (Note: the subscripts CPP and SO refer to Cattle, Poultry and Figs, and Sheep and Other animals, respectively)
- \( EF_{SN} \) = emission factor for N₂O emissions from N inputs, kg N₂O-N (kg N input)⁻¹ (Table 11.1)
- \( EF_{FPRP} \) = emission factor for N₂O emissions from N inputs to flooded rice, kg N₂O-N (kg N input)⁻¹ (Table 11.1)
**Equation 11.5**

N in urine and dung deposited by grazing animals on pasture, range and paddock (Tier 1)

\[ F_{PRP} = \sum_t \left( N_{T(t)} \times N_{exx(T)} \right) \times MS_{T, PPR} \]

Where:

- \( F_{PRP} \) = annual amount of urine and dung N deposited on pasture, range, paddock and by grazing animals, kg N yr\(^{-1}\)
- \( N_{T(t)} \) = number of head of livestock species/category \( T \) in the country (see Chapter 10, Section 10.2)
- \( N_{exx(T)} \) = annual average N excretion per head of species/category \( T \) in the country, kg N animal\(^{-1} \) yr\(^{-1}\) (see Chapter 10, Section 10.5)
- \( MS_{T, PPR} \) = fraction of total annual N excretion for each livestock species/category \( T \) that is deposited on pasture, range and paddock\(^{11}\) (see Chapter 10, Section 10.5)

**Equation 10.30**

Annual N excretion rates

\[ N_{exx(T)} = N_{min(T)} \times \frac{TAM}{1000} \times 365 \]

Where:

- \( N_{exx(T)} \) = annual N excretion for livestock category \( T \), kg N animal\(^{-1} \) yr\(^{-1}\)
- \( N_{min(T)} \) = default N excretion rate, kg N (1000 kg animal mass\(^{-1}\)) day\(^{-1}\) (see Table 10.19)
- \( TAM_{T} \) = typical animal mass for livestock category \( T \), kg animal\(^{-2}\)

\[ N_{2}O = N_{2}O-N \times 44/28 \]
Figure 18 - Nutrient Management Map

Legend

Nutrient Management Type:
C = Chemical Fertilizer
L = Liquid Effluent
M = Manure Excreted
S = Sludge
APPENDIX J

HAWAI‘I DAIRY FARMS: DEMOGRAPHIC AND ECONOMIC ASSESSMENT

PLASH ECON PACIFIC (PEP) INC
HAWAI‘I DAIKY FARMS:
SOCIOECONOMIC CONDITIONS,
ECONOMIC IMPACTS, AND FISCAL IMPACTS
HAWAIʻI DAIRY FARMS:
SOCIOECONOMIC CONDITIONS,
ECONOMIC IMPACTS, AND FISCAL IMPACTS

PREPARED FOR:
Hawaiʻi Dairy Farms

PREPARED BY:
Plasch Econ Pacific LLC
under subcontract to
Group 70 International

May 2016
CONTENTS

EXECUTIVE SUMMARY ................................................................. ES- 1

PART I: INTRODUCTION AND PROPOSED DAIRY ........................................... I- 1
1. Introduction .................................................................................................................. I- 1
   a. Content and Purpose ............................................................................................... I- 1
   b. Methodology ............................................................................................................ I- 1
   c. Organization of the Report ..................................................................................... I- 3
   d. Economic Consultant ............................................................................................. I- 3
2. Dairy Acreage and Location ...................................................................................... I- 3
3. Plans for the Dairy .................................................................................................... I- 5
   a. Contributions .......................................................................................................... I- 5
   b. Land Use ................................................................................................................ I- 5
   c. Rotational Pasture Grazing .................................................................................... I- 5
   d. Cow Breed .............................................................................................................. I- 6
   e. Milking .................................................................................................................... I- 6
   f. Calves ...................................................................................................................... I- 6
   g. Related Ranch Operations .................................................................................... I- 6
   h. Products ................................................................................................................ I- 6
   i. Reuse of Nutrients ................................................................................................ I- 7
   j. Improvements ........................................................................................................ I- 7
   k. Future Plans .......................................................................................................... I- 8

PART II: SOCIO-ECONOMIC CONDITIONS ....................................................... II- 1
1. Socio-Economic Conditions, Kaua‘i ................................................................. II- 1
   a. Population ............................................................................................................. II- 1
   b. Population Characteristics and Distribution ...................................................... II- 1
   c. Households .......................................................................................................... II- 1
   d. Housing ................................................................................................................. II- 2
   e. Income and Education .......................................................................................... II- 2
   f. Primary Economic Activities ............................................................................... II- 2
2. Socio-Economic Conditions, Kōloa-Poʻipū .................................................. II- 6
   a. Population and Distribution ................................................................. II- 6
   b. Households ..................................................................................... II- 6
   c. Housing ............................................................................................ II- 8
   d. Income and Education ..................................................................... II- 8
   e. Primary Economic Activities ........................................................... II- 8
   f. Labor Force and Employment ............................................................ II- 9
   g. Home Prices ..................................................................................... II- 9
   h. Assessed Property Values .................................................................. II- 9
   i. Projected Growth .............................................................................. II-11

PART III: ECONOMIC AND FISCAL IMPACTS ........................................ III- 1

1. Plans for the Dairy ............................................................................... III- 1

2. Economic Impacts of Development Activities ..................................... III- 1
   a. Development Period .......................................................................... III- 1
   b. Construction Expenditures ................................................................ III- 1
   c. Equipment Expenditures .................................................................... III- 2
   d. Indirect Sales Generated by Construction Activity .......................... III- 2
   e. Summary of Expenditures and Sales ................................................ III- 2
   f. Profits .................................................................................................. III- 2
   g. Employment ....................................................................................... III- 2
   h. Payroll ............................................................................................... III- 3
   i. Sources and Training of Construction Workers ............................... III- 3
   j. Supported Population and Housing .................................................... III- 4

3. Economic Impacts at Full Operations .................................................... III- 4
   a. Milking Cows .................................................................................... III- 4
   b. Production .......................................................................................... III- 4
   c. Sales .................................................................................................... III- 4
   d. Profits .................................................................................................. III- 5
   e. Employment ........................................................................................ III- 5
f. Payroll ................................................................. III- 5

4. Impacts on County Revenues and Expenditures ........................................ III- 6
    a. Development Activities ........................................ III- 6
    b. Operations at Full Development ................................ III- 6

5. Impacts on State Revenues and Expenditures ........................................ III- 7
    a. Development Activities ........................................ III- 7
    b. Operations at Full Development ................................ III- 7

6. Other Benefits ................................................................. III- 7
    a. Open Space ........................................................ III- 7
    b. Potential Educational Tours .................................... III- 8

7. Nuisance Issues and Impacts ................................................................. III- 8
    a. Impacts of Concentrated Animal Feeding Operations on Property Values ..... III- 8
    b. Nuisance Impacts of Past and Current Agricultural Activities in Kōloa-Poʻipū ...... III- 9
    c. Nuisance Impacts ................................................ III-13
    d. Economic Impacts from Nuisances ................................ III-18

8. Summary of Significant Benefits and Impacts ........................................ III-19

REFERENCES ........................................................................... R- 1

FIGURES
    I-1. Hawai‘i Dairy Farms Map .................................................... I- 4
    II-1. Visitor Arrivals, Kaua‘i: 2000 to 2015 .................................... II- 3
    II-2. Kōloa-Poʻipū Census Subdivision ................................ II- 7
    II-3. Agricultural Activities in Kōloa-Poʻipū: 2015 ....................... II-10
    II-4. Hawai‘i Dairy Farm and Nearby Properties ........................ II-12
    II-5 Assessed Values of Nearby Properties: 2016 ....................... II-13
    II-6 Assessed Values of Other Properties: 2016 ....................... II-14
    III-1. Odor Detection Limit for 699-cow Dairy ........................ III-16
    III-2. Odor Detection Limit for 2,000-cow Dairy ........................ III-17

TABLES FOR PART II
II-4. Visitor Plant Inventory, Kaua‘i: 2015

**Tables for Part III**

III-1. Plans for the Dairy
III-2. Economic Impacts of Development Activities
III-3. Economic Impacts at Full Operations
III-4. Impacts on County Revenues and Expenditures
III-5. Impacts on State Revenues and Expenditures
EXECUTIVE SUMMARY

1. PROPOSED DAIRY

In 2013, Ulupono Initiative funded Hawai‘i Dairy Farms (“HDF” or the “Dairy”). The Dairy was formed to increase Hawai‘i’s supply of milk and thereby reduce dependence on imported milk, bolster food security for the islands with a sustainable supply of milk, and help diversify the economy.

The Dairy will be located in Māhā‘ulepū Valley in Kōloa, Kaua‘i because the site meets the operational requirements for a dairy, and the Valley was found to provide ideal growing conditions for grass feed and dairy cows. Based on the most successful island dairy models in the world, the Dairy will be the first in Hawai‘i to use rotational pasture-grazing. The two existing dairies in Hawai‘i and most dairies on the mainland use feedlots. Also, the Dairy will use the most advanced dairy-farming techniques, including: (1) precision monitoring of the health of the cows; (2) technology to determine the productivity of the land and, ultimately, its carrying capacity; (3) effluent management to ensure environmental health and safety; and (4) other best management practices.

HDF is committed to establishing a herd of up to 699 mature dairy cows, and demonstrating that rotational pasture-grazing is an economically and environmentally sustainable model for Hawai‘i. With proven success, HDF may expand the herd up to the carrying capacity of the land, which is currently estimated to be up to 2,000 productive milking dairy cows. For dairy operations with 700 or more milking cows, additional regulatory review and permitting by the State Department of Health will be required. The process for the additional approvals, including public notification and input, will be followed if and when HDF decides to pursue an expanded operation.

2. SOCIO-ECONOMIC CONDITIONS

The Dairy site is located in the Kōloa-Po‘ipū region. This region has socio-economic conditions similar to those of the entire island except for the following:

— Demographic
  • Slower population growth.
  • During the previous decade, a slight decline in the male population and a significant increase in the female population (evidently, many males left due to more attractive opportunities elsewhere).
  • A slightly older population, with fewer school-age children and more retirees.
EXECUTIVE SUMMARY

- More whites and fewer Asians and Native Hawaiians/Other Polynesians.
- More residents born in another state.
- Smaller households.
- More homes for seasonal, recreational or occasional use.

— Income and Education
- Higher per-capita incomes.
- Less poverty.

— Property Values
- Higher average values for both single family homes and condominiums.

It should also be noted that the economy of the region and the entire island depend heavily on tourism, with about 36% of the visitor units located in the Poʻipū area.

3. AGRICULTURAL BENEFITS

a. Increased Food Self Sufficiency

Milk

The Dairy will increase Hawaiʻi’s milk self sufficiency and reduce fluid milk imports. At full steady-state operations achieved after the pasture matures, the Dairy will produce about 1.5 million gallons of milk per year for a 699-cow dairy. Should HDF decide, in the future, to expand the herd up to 2,000 milking cows, milk production could reach 4.4 million gallons. This compares to about 4 million gallons produced in Hawaiʻi in 2015. Production was down from a peak of about 18.3 million gallons in 1988 when Hawaiʻi dairies supplied nearly all of the milk consumed in the state.

Livestock

In addition, the Dairy will increase the supply of livestock, including female calves for other dairies, male calves for beef ranching, and culled cows and heifers for beef or dairy operations.

b. Open Space

The Dairy’s irrigated pasture will provide about 470 acres of well-maintained grassland divided into 119 fenced paddocks. The herd will be split into 6 groups, each of which will be rotated among the paddocks. Thus, at any given time, about 5% of the pasture land will be occupied by cows (6 of 119 paddocks), and about 95% will be unoccupied green open space. In addition, about 77 acres will be used for cow raceways, internal roads, and setbacks along drainage ditches.
4. Employment Benefits

a. Construction and Related Employment

Development of the Dairy and related processing facilities will employ an average of about 12 construction workers during the 2-year construction period for the dairy. Indirect employment related to Dairy development is expected to average about 16 jobs on Kaua‘i and 8 jobs on O‘ahu. Thus, total direct-plus-indirect employment associated with Dairy development will average about 36 jobs, of which about 28 jobs will be on Kaua‘i. The actual job counts will fluctuate over time, depending on the pace of construction.

b. Operating Employment

At full operations, the 699-cow dairy will provide about 11 jobs on Kaua‘i, including about 5 farm jobs and about 6 indirect jobs. About 3 indirect jobs will be on O‘ahu.

Corresponding employment figures for the 2,000-cow dairy are about double.

5. Fiscal Benefits

a. County

Development of the Dairy is expected to have a negligible impact on County finances inasmuch most taxes on construction activity is collected by the State, and HDF will provide needed infrastructure (interior roads, water distribution, drainage, etc.). Also, most construction workers are expected to be from Kaua‘i, so they already pay taxes and will not require additional services from the County.

At full operations, the Dairy is expected to generate net income to the County of about $51,000 for the 699-cow Dairy. Should HDF decide, in the future, to expand to a 2,000-cow Dairy, net income to the County would be about the same. Most of the taxes will come from property taxes on improvements.

Dairy workers and their families will pay a variety of taxes to the County, while also requiring County services. For these workers and families, the resulting net revenues are expected to be near zero but positive since the County budget is structured to break even, and most Dairy workers will earn wages higher than the County average.

b. State

Unlike the County, the State will derive significant revenues from development activity: a cumulative total of about $650,000 for both the 699-cow dairy and the 2,000-cow dairy. However, the revenues will be offset by the $1 million tax credit for improvements on land designated by the State Land Use Commission as Important Agricultural Lands. Most construction workers are expected to be from Hawai‘i, so they already pay taxes and will not require additional services from the State.
When the Dairy is operational, net income to the State is expected to exceed $60,000 per year for the 699-cow Dairy, and exceed $170,000 per year should HDF decide, in the future, to expand to a 2,000-cow Dairy.

6. Nuisance Issues and Impacts

Given the important economic, residential, and recreational role of the Kōloa-Poʻipū region, the Dairy must be compatible with, and not cause adverse impacts on regional resorts, commercial areas, homes, recreational activities, etc.

The Dairy will feature modern facilities and practices, and will comply with all applicable Federal and State environmental standards. Considerable distances will separate the Dairy from the resorts, commercial areas, homes and recreational areas. The nearest resort units are about 1.5 miles from a Dairy paddock and about 2.4 miles from the Dairy milking parlor. For the Kōloa town center, the distances from the closest paddock and dairy facilities are about 2.2 and 2.8 miles, respectively. For homes, the distances are about 1 and 2 miles away, respectively. And for recreational activities, the distances are about 0.6 mile and 1.3 miles, respectively.

The environmental studies indicate that no noticeable noise, dust, odors, flies, runoff, or other nuisance impacts will extend to resort, commercial, residential or recreational areas. Noticeable nuisance impacts occurring outside the Dairy property will be limited to the abutting farm and ranch lands which are owned by Māhāʻulepū Farm, lessor of the Dairy property. These abutting lands are designated Important Agricultural Lands, so they will remain in agriculture for the foreseeable future.

In view of these findings, the Dairy will not adversely affect:

— Guests of resorts in the Kōloa-Poʻipū region.
— Recreational activities in the region.
— The regional economy (number of visitors, visitor expenditures, retail sales, employment, incomes, etc.)
— Residents when at home in the region.
— Property sales in the region (single-family homes, condominiums, second homes, time-share units, etc.).
— Values of properties in the region.
— County or State taxes derived from residents, resorts, or commercial activities in the region.

From a broader perspective, the Dairy will help maintain the existing rural character and ambience of the Kōloa-Poʻipū region.
HAWAI‘I DAIRY FARMS:
SOCIO-ECONOMIC CONDITIONS,
ECONOMIC IMPACTS, AND FISCAL IMPACTS

PART I: INTRODUCTION AND PROPOSED DAIRY

1. INTRODUCTION
   a. Content and Purpose

      In 2013, Ulupono Initiative funded Hawai‘i Dairy Farms (‘’HDF’’ or ‘’Dairy’’). The Dairy will be located in Kōloa, Kaua‘i.

      This report addresses the socio-economic conditions on Kaua‘i and the Kōloa-Po‘ipū region, plus the economic and fiscal impacts of the Dairy. The purpose is to provide the community and State and County officials with relevant information about planned development and operations.

      Socio-economic conditions includes information about the population, housing, incomes, education, economic activities, employment, labor force, and property values on Kaua‘i and in Kōloa-Po‘ipū.

      Economic impacts cover sales and expenditures, profits, employment, and payroll related to (1) construction and related activities, and (2) full operations of the Dairy. Also covered is the impact of the Dairy on property values.

      Fiscal impacts address the impact of the Dairy on County and State revenues and expenditures. The material covers the increase in County and State tax revenues, the increase in government support expenditures, and the resulting net revenues to the County and State.

   b. Methodology

      Socio-economic Conditions

      Demographic data for this report was gathered from the U.S. Census Bureau. Data is presented for Kaua‘i County and the Kōloa-Po‘ipū Census Subdivision. Population counts are provided for 2000 and 2010 from the decennial census. Demographic, social, household and economic characteristics of the population were obtained from the 2000 decennial census and the American Community Survey (‘’ACS’’) for 2009-2013. The ACS is an ongoing survey that provides up-to-date information about the nation’s population. The ACS includes
questions that were not included in the 2010 decennial census (but, historically, were included in the 2000 census). The ACS releases data every year in the form of estimates. The most up-to-date available data from the ACS are five-year estimates from 2009-2013. In addition to providing population counts for 2000 and 2010, this report provides an analysis of population characteristics for 2000 and an estimate for the period covering 2009-2013.

Additional information on socio-economic conditions and projections for the County and Kōloa-Po'ipū was obtained from the County of Kaua‘i, State Department of Labor and Industrial Relations (“DLIR”), the Hawaii Tourism Authority, and the State Department of Business, Economic Development and Tourism.

Residential sales price data was obtained from Locations Hawai‘i, while assessed property value information for individual properties located nearest to the proposed Dairy were gathered from RealQuest Professional, a private data service that compiles local real property tax data.

**Economic and Fiscal Impacts**

**Multipliers**

The proposed development and operations are translated into economic and fiscal impacts based on a number of multipliers (for example, indirect sales as a percentage of direct sales, construction jobs per $1 million in expenditures, indirect jobs per direct jobs, and tax rates). These multipliers reflect the professional judgment of the consultant, and were derived based on information from the following sources: U.S. Census data; the State of Hawai‘i Data Book; The Hawai‘i State Input-Output Study: 2007 Benchmark Report (I-O Model); employment and labor rates from DLIR; County and State tax rates; and revenue and expenditure data from the County and the State.

**2015 Dollars**

For the economic and fiscal impacts (Part III), dollar amounts are expressed in terms of 2015 purchasing power and market conditions. Values, prices, costs and dollar amounts for prior years are adjusted for inflation to 2015 dollars based on the Honolulu Consumer Price Index (CPI) for Urban Consumers. Dollar amounts after 2015 are not increased to account for inflation, appreciation in property values, changes in labor rates, changes in building costs, or other changes in market conditions.

**Accuracy of Estimates**

Much of the analysis contained in this report is quantitative in nature, where numbers are used to help communicate anticipated impacts. However, these numbers should not be interpreted as precise predictions. Rather, they represent the best estimates of what is expected to occur based on available information about planned development and operations,
market conditions, and tax rates. As a general rule, economic and fiscal impact estimates in this report are accurate within about 25%.

c. **Organization of the Report**

The report is divided into three Parts:

— Part I: Introduction and Proposed Dairy
— Part II: Socio-Economic Conditions
— Part III: Economic and Fiscal Impacts

All Figures in this report are embedded in the text, while all tables are at the end of the report. Socio-economic conditions for Kaua‘i and Kōloa-Po‘ipū are presented in Tables II-1 to II-9. Economic and fiscal impacts are presented in Tables III-1 to III-5: In these tables, the quantities appearing in **bold** highlight the most significant impacts.

d. **Economic Consultant**

The analysis was conducted by Plasch Econ Pacific LLC, a Hawai‘i-based economic-consulting firm specializing in economic development, land and housing economics, feasibility studies, valuations, market analysis, public policy analysis, and the economic and fiscal impacts of projects.

2. **Dairy Acreage and Location**

The Dairy will occupy about 557 acres in Māhā‘ulepū Valley in Kōloa, Kaua‘i (see Figure I-1). The Tax Map Keys (TMKs) for the property are: (4) 2-9-003:001 (portion), (4) 2-9-003:006 (portion), and (4) 2-9-001:001 (portion). The land is being leased from Māhā‘ulepū Farm, LLC.

This site was chosen for the Dairy for the following reasons:

— Kaua‘i Island was determined to best meet the operational requirements for the Dairy.

— Māhā‘ulepū Valley has ideal conditions for the Dairy, including favorable soils, high solar radiation, and other agronomic conditions for growing nutritious forage; a sufficient supply of water for cows and for irrigating pastures; minimally sloped terrain with few stones, allowing safe navigation by cows; sufficient contiguous land to support an economically viable pasture-based dairy; long-term availability of the land; and good access.

— The site is sufficiently removed from resorts, residential communities, and recreational areas so as to avoid potential nuisance impacts (noise, dust, odors, flies, runoff, etc.).
Figure I-1. Hawai‘i Dairy Farms Map
Māhāʻulepū Valley has been used for commercial agriculture for over 140 years, notably for cultivating sugarcane as part of the Kōloa Plantation, then by McBryde Sugar Co. which ceased operations in 1996. Ranching began in the valley in 1986, and taro cultivation was introduced on an adjacent parcel in 2007.

In response to a petition by Māhāʻulepū Farm, the State Land Use Commission designated in 2011 about 1,533 acres in Māhāʻulepū as Important Agricultural Lands (“IAL”). This designation, which includes the Dairy site, ensures that the land will remain in agriculture for the foreseeable future.

3. Plans for the Dairy

a. Contributions

Until 1984, a number of local dairies throughout Hawaiʻi produced all of the milk consumed in Hawaiʻi. But by 2008, most of them had closed due to the high cost of imported feed and competition from low-cost mainland milk imports. Currently, the two remaining dairies, both of which are located on the Big Island, supply only about 10% of the fresh milk consumed in Hawaiʻi, while imports supply about 90%.

The proposed Dairy will reverse this decline. It will increase the supply of local milk and thereby reduce imports, bolster food security for the islands with a sustainable supply of milk, and help diversify the economy.

b. Land Use

The 557-acre Dairy site will include: (1) about 10 acres for farm structures and related facilities; (2) about 470 acres for pastures; and (3) about 77 acres for cow raceways, internal roads, and setbacks along drainage ditches.

c. Rotational Pasture Grazing

The Dairy will be the first in Hawaiʻi to employ rotational pasture-grazing. A herd of up to 699 milking cows will be divided into six mobs, each of which will be rotated systematically through about 119 fenced paddocks to feed on locally grown pasture grass, supplemented with other feeds and vitamins as needed. Kikuyu grass was selected as the most productive and nutritious grass for rotational grazing. About every 12 to 18 hours, each mob of cows will be moved from one paddock to another in order to prevent overgrazing of the pastures within paddocks, and to allow the pastures to recover between grazings. This approach optimizes grass growth, cow health, and milk production; facilitates even deposits of manure for fertilization; and reduces erosion and runoff. The Dairy will use the most advanced dairy-farming techniques, including: (1) precision monitoring of the health of the cows and the productivity of the grass; (2) technology to determine the productivity of the land and, ultimately, its carrying capacity; (3) effluent management to ensure environmental health and safety; and (4) other best management practices.
In contrast to the Dairy’s rotational pasture-grazing approach, traditional dairies enclose their milking cows in feed lots where the cows feed on grains, hay and/or silage. In Hawai‘i, however, this approach requires farmers to import expensive feed for their animals. The alternative to importing feed is to produce it locally. This has been attempted many times over the past 40 or more years. Problems have included grain-eating birds; humidity that is too high to dry forage crops for hay; occasional high winds or heavy rains which damage feed crops; the high cost of harvesting, processing, and transporting grass to produce silage; etc. The rotational pasture-grazing approach eliminates many of these problems.

d. Cow Breed

The Dairy will use Kiwi-cross cows, which are a cross breed of Friesian-Holstein and Jersey milking cows. They are small in stature, bred to produce milk from grass, and their milk has a high butterfat and protein content, which allows for a wide variety of added-value dairy products such as yogurt and cheese.

e. Milking

The cows will be moved via a system of raceways (aka walkways) to the milking parlor where they will be milked twice a day. The milking will take place on a highly automated 60-stall rotary, which completes one rotation every 9 minutes or so. With this system, the maximum milking time is 10 minutes, and the maximum time off-pasture per milking is 1 hour.

f. Calves

Newborn calves will stay in single crates for up to 10 days, after which they will be transferred to pens that will hold 20 calves each. At age 3 to 4 weeks, calves will transition to pasture. At about 90 days of age, the calves will be transferred to another ranch (see next subsection).

g. Related Ranch Operations

Dry cows, heifers, and calves older than 90 days will be managed off-property on existing ranches that are owned and operated by other local ranchers.

h. Products

The Dairy will produce raw milk that will be sold in bulk to a dairy processor who will process and package the milk and related products for sale to consumers.

Additional revenues will be derived from the sale of female calves to other dairies, male calves for beef ranching, and culled cows and heifers for beef or dairy operations.
i. **Reuse of Nutrients**

Manure captured during the milking process will be transferred via underground pipes to two nearby effluent ponds (about 7,600 sq. ft. and about 20,500 sq. ft.), where solids will settle out and the remaining fluid stored for application to the pasture via the irrigation system. When applied to the pasture, this nutrient-rich fluid will be mixed with non-potable irrigation water.

The effluent ponds will be constructed within a secondary containment berm, and the ponds be lined with a flexible membrane of synthetic material.

j. **Improvements**

In converting former sugarcane fields to pastures, the existing infrastructure will be reused where possible. This will include gravel access roads, field roads, reservoirs, pipelines, irrigation ditches, drainage-ways and culverts. Field improvements will include a livestock water-distribution system, two pivot irrigation systems, cow raceways, perimeter and paddock fencing, and additional culverts.

Dairy buildings and related facilities will occupy approximately 10 acres along the western boundary of the farm. The milking parlor (about 22,700 sq. ft.) will be the largest structure on the property, and will include the rotary milking system, a covered milk loading area, holding pens, supplemental feeding facilities, a mechanical room, a pump room, office space, veterinary space and storage, staff restrooms, and containers for milk storage and cooling.

Two calf sheds (each about 2,100 sq. ft.) will provide safe housing for newly born calves. The sheds will have feeding and bedding areas, and one shed will have a milk kitchen and 30 single calf crates.

An implementation shed (about 1,700 sq. ft.) will provide space for storing equipment, tools and farm machinery. This shed will also include a workshop.

Additional improvements will include paved access roads, a paved turnaround area for milk tanker trucks, parking for employees, feed silos, milk storage tanks, a paved holding pen (about 12,300 sq. ft.) for mobs waiting to enter the milking parlor, effluent ponds for manure, a potable water system for both humans and cows, electrical power, communications, a septic system for waste disposal, and photovoltaic panels on roofs for solar power generation.

An existing on-site well will supply potable water, and Waitā Reservoir will supply non-potable irrigation water.

Equipment will include the milking system, tractors, trucks, other farm equipment, mobile tankers, refrigeration, heating, freight containers, office furniture and equipment, etc.
k. Future Plans

HDF is committed to demonstrating that the rotational pasture-grazing approach is an economically and environmentally sustainable model for Hawai‘i. In the future, HDF may expand the herd to the maximum carrying capacity of the land—estimated by HDF to be up to 2,000 productive cows. Additional regulatory review and permitting would be required by the State Department of Health (“DOH”) for 700 or more milking cows. The process for the additional approvals, including public notification and input, will be followed if and when HDF decides to pursue an expanded operation.

Eventually, a milk processing plant might be built in an existing industrial area on Kaua‘i or O‘ahu if warranted. The plant would produce finished milk packaged for consumers, and possibly some milk-related products (e.g., yogurt and cheeses).
PART II: SOCIO-ECONOMIC CONDITIONS

1. SOCIO-ECONOMIC CONDITIONS, KAUAI

Tables II-1 to II-9 summarize socio-economic conditions for Kaua‘i County, as well as Kōloa-Po‘ipū which is discussed in the next section. Kaua‘i County includes two populated islands: Kaua‘i and the small nearby island of Ni‘ihau. The data reflect almost entirely the population and economy of the island of Kaua‘i because the privately owned island of Ni‘ihau contains only 0.3% of the County’s population and supports an even smaller percentage of the County’s economic activity.

a. Population

In 2010, Kaua‘i County had a population of about 67,100 residents, up 14.8% since the 2000 U.S. census (see Table II-1). Residents include those who live full-time or permanently on Kaua‘i, and exclude visitors and part-time residents (i.e., those who reside most of the time in a primary home located elsewhere).

The total County population amounted to only 4.9% of the State population—the smallest of the four counties. Only 170 of the residents, primarily Native Hawaiians, lived on Ni‘ihau.

Most Kaua‘i residents live in towns around the perimeter of the island, primarily along the east and south shores, with smaller populations living in towns on the north shore. There are no towns on the northwest side of the island or in the mountainous interior.

b. Population Characteristics and Distribution

Kaua‘i’s population is racially diverse (see Table II-1). For the period spanning 2009 and 2013, Asians comprised 35.7% of the County’s population, while people of two or more races made up 19.8% and Native Hawaiian and Other Pacific Islanders represented 9.9%. Kaua‘i County has a slightly higher proportion of white residents compared to the State as a whole; 33.4% of County residents were white compared to 25.0% in the State as a whole. Approximately 55.9% of Kaua‘i County residents were born in Hawai‘i. The median age of Kaua‘i residents was 41.6 years old between 2009 and 2013. Consistent with national demographic trends, Kaua‘i County’s population is aging. In 2000, the median age was 38.4 years old.

c. Households

The average household size in Kaua‘i County was 2.99 people per household between 2009 and 2013, a slight increase from 2.87 people per household in 2000 (see Table II-1).
Approximately 62.6% of Kaua'i households are homeowners—a percentage that has not changed significantly over the past decade.

d. **Housing**

Between 2009 and 2013, Kaua'i County had an estimated 29,972 housing units, up 18.3% from 2000 (see Table II-1). This figure includes resort/residential units that are used as second homes, or are available for visitors, or are vacant. Approximately 25.3% of housing units in the County were vacant, including 14.4% that were for seasonal, recreational, or occasional use. Kaua'i County has a higher proportion of vacant resort/residential units compared to the State as a whole. Between 2009 and 2013, just 13.8% of housing units in Hawai'i were vacant, including 6.1% that were for seasonal, recreational, or occasional use.

e. **Income and Education**

Table II-2 provides information on income levels and education for the residents of Kaua'i. The median household income between 2009-2013 is estimated at $62,052—an increase of 37.8% since 2000. An estimated 11.2% of the County population was living below poverty level; 90.1% had a high school degree or higher; and 92.1% spoke English well or very well.

f. **Primary Economic Activities**

The principal economic driving forces for the economy of Kaua'i County are tourism, agriculture, and technology and defense. Table II-3 summarizes key economic characteristics for Kaua'i County.

*Tourism*

Kaua'i hosted over 1.11 million visitors in 2014, and visitor expenditures totaled approximately $1.47 billion, making tourism the dominant industry in the County. Visitors to Kaua'i in 2014 represented 13.6% of the State’s visitor arrivals by air, and 10% of Statewide visitor spending.

Figure II-1 presents the annual number of visitor arrivals to Kaua'i County since 2000. As shown, visitor arrivals have been on the rebound since 2009, when the County had less than 1 million visitor arrivals annually. Since that time, visitor arrivals increased steadily.

There were 8,582 visitor units on the island of Kaua'i in 2015, including 1,387 condominium hotel units, 2,667 hotel units, and 2,632 timeshare units (see Table II-4).
Figure II-1. Visitor Arrivals, Kaua‘i: 2000 to 2015
**Defense and Technology**

Located in the southwest corner of Kaua'i, the Pacific Missile Range Facility (PMRF) is the world’s largest instrumented multi-environment range to support surface, subsurface, air and space operations. PMRF also provides fleet training for the U.S. Navy and the navies of allied nations and plays a significant role in the testing and evaluation of future systems, including the AEGIS ballistic missile defense system and upcoming THAAD (Terminal High Altitude Air Defense) system. Operations vary from small, single-unit exercises to large, multiple-unit battle-group scenarios. Also, the research and testing operations conducted at PMRF have spawned branch operations on Kaua'i of a number of high-technology companies.

PMRF is a major contributor to the economy of Kaua'i County, particularly on the west side of the island. PMRF is one of Kaua'i’s largest employers with nearly 1,000 active duty Navy, government, civil service and contract civilians, and Hawai'i Air National Guard members. PMRF’s prime contractor is ITT Services, with approximately 500 employees, providing base support as well as high-tech range safety and scheduling operations. Numerous other contractors, both on and off Kaua'i, are associated with PMRF.

**Agriculture**

For more than a century, sugarcane was the economic mainstay on Kaua'i. In 1980, about 53,600 acres were used for growing sugarcane (see Table II-5). However, the industry suffered major contractions starting in the 1980s, and the last sugar plantation on Kaua'i (Gay & Robinson, Inc.) closed in 2010.

Some of the former sugarcane fields are now used for diversified crops (crops other than the plantation crops of sugarcane and pineapple)—principally coffee (about 3,800 acres) and seed corn (about 13,300 acres). The seed companies reduced their use of land on Kaua'i in 2015 by over 3,000 acres. Furthermore, they cultivate only about 25% of the land they use and fallow about 75%. Since 1980, the amount of land used for other diversified crops and intensive livestock operations (dairy, hog, and poultry) declined by nearly 500 acres and over 250 acres, respectively. Also, about 1,700 acres of farmland are now used for commercial forests, and about 13,000 additional acres are used for grazing cattle. Cattle grazing is a comparatively low-value use of farmland.

Finally, some of the former farmlands are now used for residential communities and other urban development.

Despite the contraction in the sugar industry, revenues from crops grown on Kaua'i increased from $42.4 million in 2000 to $74.6 million in 2008, the latest year data is available for the County. The increase in revenues can be attributed largely to seed operations. Revenues from livestock and aquaculture sales, however, declined from $6.0 million in 2000 to $3.3 million in 2008.
g. Labor Force and Employment

In 2014, Kaua‘i County’s civilian labor force numbered 34,600 workers, up 14.4% since 2000 (see Table II-3). Employed civilians totaled 42,950 workers. The unemployment rate in 2014 was 4.9%. Unemployment in the County fluctuated over the 14 years, peaking at 9.8% in 2009 when the national economy was in a recession. Since that time, the County’s unemployment rate has gradually decreased each year as the economy recovered and the tourism industry strengthened.

There were 29,400 jobs in Kaua‘i County in 2014, an increase of 10.7% from 2000. The leisure and hospitality industry represents the largest proportion of jobs in the County, accounting for 9,300 jobs or 31.6% of countywide jobs. Other industries comprising a large portion of jobs in the County include: Trade, transportation & utilities (5,800 jobs, 19.7%), government (4,600 jobs, 15.6%), professional and business services (2,800 jobs, 9.5%), and educational & health services (2,700 jobs, 9.2%).

Table II-6 also includes job counts for Kaua‘i, but for 2011. This table also includes counts for Kōloa-Po‘ipū which is discussed in the next section.

h. Home Prices

Table II-7 presents home sales prices for 2013 to 2015. The median sales price for single-family homes on Kauai in 2015 was $615,000, 15.4% higher than the median price in 2014. Condominium sales prices have also trended upwards in 2015. The median sales price for condominiums on Kauai was $365,000, a 5.5% increase over the 2014 median price.

i. Projected Growth

As part of the Kaua‘i General Plan Update, consultants for the County of Kaua‘i Planning Department prepared socio-economic forecasts for the County. Table II-9 summarizes past growth for the 10-year period from 2000 to 2010, and future projected growth for the 20-year period from 2010 to 2030. Continuation of growth at about the same average rate would result in a percentage change for the future 20-year period that is about double that of the past 10-year period.

As shown, Kaua‘i’s resident population is projected to grow from about 67,100 residents in 2010 to about 83,300 residents 2020. This reflects a slight deceleration of growth: from about 14.8% over the past 10 year period to about 24.2% for the future 20-year period. Consistent with this projection, slower growth is projected in the number of households on Kaua‘i as well as the number of housing units.

Kaua‘i’s average visitor census is expected to grow to from about 19,500 visitors in 2010 to about 25,700 visitors in 2030. This reflects an acceleration of growth: from about 8.4% over the past 10-year period to about 31.7% for the future 20-year period. Correspondingly, faster growth is projected for the de facto population (residents plus visitors less absent
residents), wage and salary jobs (largely tied to tourism growth), and the number of visitors arriving by air. In spite of faster growth in the number of visitors on Kaua‘i, slower growth is projected in the number of visitor units on the island: that number is projected to increase 20.2% from 9,345 units in 2010 to 11,230 units in 2030. For the previous 10-year period, the increase was 30.5%.

2. SOCIO-ECONOMIC SETTING, KÔLOA-PO‘IPŪ

The proposed Hawai‘i Dairy Farm is located within the Kôloa-Po'ipū District (defined as the Kôloa-Po'ipū Census Subdivision as shown in Figure II-2). This district includes the coastal communities of Po'ipū and Kukui'ula.

a. Population and Distribution

In 2010, the Kôloa-Po'ipū District had a resident population of approximately 5,700, or 8.4% of the County population. The population in Kôloa-Po'ipū grew at a slower rate than the County as a whole, increasing by 5.2% from 5,400 residents in 2000. During the previous decade, the male population declined by 1.4% while the female population increased 20.9% (See Table II-1). Evidently, many males left due to more attractive opportunities elsewhere.

Similar to Kaua‘i County as a whole, the resident population of the Kôloa-Po'ipū region is racially diverse. Between 2009 and 2013, white residents comprised a slightly higher proportion of the Kôloa-Po'ipū population compared to the County as a whole; 42.1% of residents were white compared to 33.4% of residents in the County (Table II-1). A slightly lower proportion of the Kôloa-Po'ipū population was born in the State of Hawai‘i; an estimated 51.6% of the region’s population was native born to the State compared to 55.9% for the County as a whole.

The resident profile of the Kôloa-Po'ipū region is slightly older than that of Kaua‘i County. The median age in Kôloa-Po'ipū was 44.8 years old between 2009 and 2013, compared to 41.6 years old in the County. The Kôloa-Po'ipū region is characterized by a higher proportion of retirement age residents (65 years and older) and a lower proportion of school age children.

b. Households

The average household size in the Kôloa-Po'ipū region was 2.68 people per household between 2009 and 2013—a decrease from 2.71 people per household in 2000 (Table II-1). On average, households in Kôloa-Po'ipū are smaller than households in the County as a whole (2.99 people per household between 2009 and 2013). The smaller household size combined with the higher median age in Kôloa-Po'ipū is indicative of a higher proportion of older residents and households without children.
Figure II-2. Kōloa-Poʻipū Census Subdivision
c. **Housing**

Between 2009 and 2013, the Kōloa-Po'ipū region had an estimated 3,704 housing units—an increase of approximately 3.1% since 2000 (Table II-1). Consistent with the population growth parameters, the region experienced a slower housing unit growth rate than the County, where the number of housing units increased by 18.3% during the same time period. Kōloa-Po'ipū has a higher proportion of vacant housing units than Kaua'i County as a whole due to the number of second homes. Approximately 36.8% of housing units were vacant for seasonal, recreational, or occasional use between 2009 and 2013 in Kōloa-Po'ipū, compared to 14.4% Kaua'i County.

d. **Income and Education**

The median household income in Kōloa-Po'ipū between 2009 and 2013 was estimated at $62,083, similar to the County as a whole (Table II-2). However, Kōloa-Po'ipū has a higher per-capita income and a lower proportion of residents living in poverty. An estimated 7.5% of residents were living in poverty in the region, compared to 11.2% for the County. A slightly higher proportion of residents in Kōloa-Po'ipū completed some secondary education compared to the County as a whole. An estimated 66.7% of Kōloa-Po'ipū residents attended some college or received a higher education degree, compared to 61.1% of County residents.

e. **Primary Economic Activities**

As with Kaua'i County, the primary economic activities in the Kōloa-Po'ipū District are tourism and, to a much lesser extent, agriculture. Defense is not a primary economic activity in the Kōloa-Po'ipū District since it has no military installations.

**Tourism**

The largest share of visitor units on Kaua'i is located in the Po'ipū/Kukui'ula area. Of the 8,582 visitor units on Kauaʻi, 3,058 (36%) units were located in Po'ipū/Kukui'ula (Table II-4). Hotels in the area include the Grand Hyatt Kaua'i Resort & Spa, Koa Kea Hotel & Resort, and the Sheraton Kaua'i Resort. The Grand Hyatt Kaua'i Resort & Spa is the closest hotel to the proposed Dairy—about 2.4 miles from the Dairy facilities. This resort provides 602 visitor units, and is the largest employer on Kaua'i—in 2014, it employed 941 workers.

Major timeshare properties in Po'ipū/Kukui'ula include the Lawai Beach Resort, Marriott Waiohai Beach Club, Nihi Kai Villas, and The Point at Po'ipū. There are also 11 condominium hotel properties in Po'ipū/Kukui'ula providing 608 units.
**Agriculture**

Hawai‘i’s sugar industry began in Kōloa in 1835, and sugarcane cultivation continued in the district until 1996 when the last plantation (McBryde Sugar Co.) finally ceased operations.

Of the 12,000+ acres that were planted in sugarcane, some of it has been or will be urbanized (e.g., the Kukui‘ula development); about 3,100 acres are planted in coffee (most of which is in the adjacent region of ‘Ele‘ele-Kalāheo); about 1,200 acres were in seed corn until 2015; about 1,200 acres are in commercial forest; and some is in other diversified crops (vegetables, tropical fruits, taro, flowers). Most of the remainder is used for low-value cattle grazing or is fallow. Figure II-3 shows agricultural activities in Kōloa and Po‘ipū in 2015.

**f. Labor Force and Employment**

As noted above, tourism is the primary industry in the Kōloa-Po‘ipū region. This is reflected in the employment distribution. In 2011—the most recent year jobs data is available at the Census Subdivision level—there were 3,752 jobs in Kōloa-Po‘ipū (see Table II-6). This accounted for 13.2% of the 28,300 County-wide jobs in 2011. The leisure and hospitality industry accounted for the vast majority of jobs in Kōloa-Po‘ipū at 69.8%. In comparison, leisure and hospitality jobs represented 29.3% of total countywide jobs during the same year. Trade, transportation & utilities jobs represented another 12.2% of jobs in Kōloa-Po‘ipū.

**g. Home Prices**

Sales prices for homes in Kōloa-Po‘ipū are significantly higher than County-wide prices. In 2015, the median sales price for single-family homes in Kōloa-Po‘ipū was $1,070,000, compared to $615,000 County-wide. The median sales price for condominium units was $425,000 in Kōloa-Po‘ipū compared to $365,000 County-wide.

Home prices for Kōloa-Po‘ipū can be monitored over time to verify that the Dairy will not adversely impact prices—see Part III, Section 7.

**h. Assessed Property Values**

Figure II-4 shows distances of various properties and designated areas in Kōloa and Po‘ipū that are closest to the Dairy. An analysis of the County’s 2016 assessed property values for those properties and areas is summarized in Figure II-5 and in Table II-8. Assessed property values (land and improvements) are the County’s estimates of market values.
Figure II-3. Agricultural Activities in Kōloa-Poʻipū: 2015
For specified properties and designated areas, Figure II-5 includes: the distance to the nearest pasture, the distance to the Dairy facilities, and the assessed values for vacant and developed properties. For designated areas with multiple properties, median values are shown. Table II-8 lists assessed values by: designated area, TMK, type of property, lot acreage, the year a home on the property was built, square footage, number of bedrooms, and number of bathrooms. For designated areas with multiple properties, median values are shown for vacant and developed properties.

Seven residential and agricultural areas and four resort properties were identified as being the closest to the proposed Dairy. In 2016 the Grand Hyatt Kauai had an assessed value of $212.8 million while the neighboring Poipu Bay Golf Course was valued at $16.3 million.

As shown in Figure II-3, many of the homes in the region are also close to existing beef-cattle operations. The values shown in Figure II-5 and Table II-8 apply also to properties near grazing operations. In addition, Figure II-6 and Table II-8 show values of select properties on the west side of Kōloa nearest grazing operations.

The properties listed in Table II-8 can be monitored over time to verify that the Dairy will not adversely impact property values—see Part III, Section 7. Ideally, just land values should be tracked since property values can change significantly with changes in the improvements on a parcel. However, for each property, Kauaʻi County combines land and improvement values into a single value—other counties separate the two.

i. Projected Growth

The socio-economic projections prepared for the County also include projections by District Planning Areas. The one that includes Kōloa and Poʻipū is the Kōloa-Poʻipū-Kalāheo District. In Figure II-2, this District includes the areas labeled (1) Kōloa-Poʻipū and (2) the adjoining ʻEleʻele-Kalāheo.

In addition to the projections for the County, Table II-9 also summarizes the projections for the combined areas of Kōloa-Poʻipū and ʻEleʻele-Kalāheo. For the most part, this Planning District is projected to grow at about the same rate or faster than that of the entire County. However, slightly slower growth is projected for the average visitor census, wage and salary jobs, and the number of visitor units.
Figure II-4. Hawai‘i Dairy Farm and Nearby Properties
Figure II-5. Assessed Values of Nearby Properties: 2016
(Assessed values from Table II-8)
Figure II-6. Assessed Values of Other Properties: 2016
(Assessed values from Table II-8)
PART III: ECONOMIC AND FISCAL IMPACTS

1. PLANS FOR THE DAIRY

Plans for the Dairy are summarized in Part I, Section 3 as well as in Table III-1. This table provides information on the Initial Dairy (up to 699 mature milking cows), a Potential Increase in the size of the Dairy (an additional 1,301 milking cow) sometime in the future, and the Potential Dairy (up to 2,000 mature milking cows).

As indicated, both the Initial Dairy and the Potential Dairy will cover about 557 acres, including (1) about 10 acres for farm structures and related facilities; (2) about 470 acres for pastures; and (3) about 77 acres for cow raceways, internal roads, and setbacks along drainage ditches.

The cows will be grouped into 6 mobs, and the pasture will be divided into about 119 fenced paddocks ranging in size from 3 to 5 acres.

This table also lists the farm improvements for (1) the pasture, (2) farm structures and related improvements, and (2) major dairy equipment.

2. ECONOMIC IMPACTS OF DEVELOPMENT ACTIVITIES

The development of the Dairy will involve installing perimeter and paddock fencing, building cow raceways and internal roads, installing an irrigation system, installing a potable water system, preparing sites for buildings, constructing buildings, installing an effluent system, installing equipment, etc. Table III-2 summarizes the direct and indirect economic impacts of these development activities. The material in the table gives the development period, construction expenditures, indirect sales generated by the construction activity, profits, employment and payroll, and the number of residents and houses supported by the development activities.

a. Development Period

As indicated in Section 2.a of Table III-2, the assumed development period is about 2 years. However, development could require more or less time, depending on future market conditions and property sales.

b. Construction Expenditures

Over the 2-year development period, total construction expenditures for the Dairy are estimated at about $7.5 million, plus or minus $1.5 million (see Section 2.b of Table III-2). This translates into average construction expenditures of about $3.75 million per year. In practice, construction expenditures will vary from year to year.
c. Equipment Expenditures

Total equipment expenditures for the Dairy are estimated at about $2 million, plus or minus $0.5 million, or about $1 million per year over the development period (see Section 2.c of Table III-2).

d. Indirect Sales Generated by Construction Activity

In addition to construction expenditures, development activities will generate indirect sales associated with supplying goods and services to construction companies and to the families of their construction workers. In turn, the companies supplying goods and services, and the families of their employees, will purchase goods and services from other companies, and so on. These indirect sales will include sales by companies supplying building materials (fencing, cement, steel, lumber, roofing materials, plumbing equipment, electrical equipment, hardware supplies, lighting, flooring, etc.); rental of construction equipment; equipment repair; warehousing services; shipping and trucking services; etc. Indirect sales also include sales by grocery stores, drug stores, restaurants, service stations, beauty salons, medical providers, accountants, attorneys, insurance agents, etc.

Based on State economic multipliers, these indirect sales are expected to average about $4.4 million per year, of which about $2.9 million will be on Kaua‘i and about $1.5 million on O‘ahu (see Section 2.d of Table III-2.).

e. Summary of Expenditures and Sales

Section 2.e of Table III-2 summarizes anticipated expenditures and sales. As indicated, construction expenditures, equipment expenditures, indirect sales related to construction, are expected to average about $9.1 million per year. About $5.7 million per year will be subject to the State 4% excise tax on final sales, while about $3.4 million per year will be subject to the 0.5% excise tax on intermediate sales.

f. Profits

Profits on direct and indirect sales generated by construction of the Dairy are estimated at about $1 million per year (see Section 2.f of Table III-2). This includes estimated profits of: construction companies, subcontractors, the companies supplying goods and services in support of construction activity and to the families of workers, etc.

g. Employment

During the 2-year development period, construction employment is expected to average about 12 jobs (see Section 2.g of Table III-2). These jobs will include supervisors, equipment operators (grading, roads, etc.), cement workers to lay foundations, metal workers,
carpenters, plumbers, electricians, roofers, glass and window installers, painters, equipment installers, etc. Other jobs related to construction will include architects, civil engineers, draftsmen, government inspectors, etc. These jobs will range over a variety of skill levels, including entry-level, semiskilled, skilled, management, and professional positions.

As with indirect sales, development activities will generate indirect jobs associated with supplying goods and services to construction companies and to the families of construction workers. In turn, the companies supplying goods and services, and the families of their employees, will purchase goods and services from other companies, and so on. Indirect jobs will include those at companies supplying building materials (fencing, cement, steel, lumber, roofing materials, plumbing equipment, electrical equipment, hardware supplies, lighting, flooring, etc.); rental of construction equipment; equipment repair; warehousing services; shipping and trucking services; etc. Other indirect jobs will include those involved with supplying goods and services to employees and their families: grocery workers, store clerks, restaurant workers, service-station workers, beauty technicians, barbers, bankers, pharmacists, veterinarians, computer technicians, medical workers, accountants attorneys, etc. The jobs will range over a variety of skill levels, including entry-level, semi-skilled, skilled, and management positions.

Based on State employment multipliers, indirect employment related to Dairy development is expected to average about 16 jobs on Kaua‘i and 8 on O‘ahu.

Thus, total direct-plus-indirect employment associated with Dairy development activities will average about 36 jobs, of which about 28 jobs will be on Kaua‘i.

h. Payroll

Development activities are expected to generate a total annual payroll of about $1.7 million per year for the Dairy, of which about $640,000 million will be for construction workers, about $690,000 for indirect employment on Kaua‘i, and about $390,000 for indirect employment on O‘ahu (see Section 2.h of Table III-2). These estimates are based on the average number of direct and indirect jobs multiplied by average wages as reported to the DLIR.

Wages will range from less than $30,000 annually to over $100,000, and are expected to average about $53,500 per year for construction jobs, about $42,900 for indirect jobs on Kaua‘i, and about $48,500 for indirect jobs on O‘ahu.

i. Sources and Training of Construction Workers

As noted above, construction employment is expected to average about 12 jobs during the 2-year development period. This is about 0.8% of the County’s 1,540 construction jobs in 2014 (DLIR). In view of this small percentage, it is expected that the construction jobs for the Dairy will be filled by workers already living on Kaua‘i. As other construction projects
are completed on the island, Kaua‘i construction workers will be hired to work on the various components of the Dairy infrastructure and buildings, and then move on to other projects. Thus, the Dairy will help keep a small number of Kaua‘i’s existing construction workers employed.

Special programs to train additional construction workers on Kaua‘i appear to be unwarranted since a sufficient number of workers are already available.

j. Supported Population and Housing

During the 2-year development period, direct and indirect jobs provided by Dairy construction will support about 79 residents housed in about 26 homes (see Sections 2.i and 2.j of Table III-2). Most of the residents supported by the direct-plus-indirect jobs are expected to live on Kaua‘i: about 63 of them housed in about 21 homes.

3. Economic Impacts at Full Operations

Table III-3 summarizes the estimated economic impacts of the Dairy at full steady-state operations achieved after about 5 to 10 years. Included are estimated milk production direct and indirect sales, profits, direct and indirect employment, payroll, and population and housing supported by Dairy operations.

a. Milking Cows

The economic impacts are estimated for two scenarios: the Initial Dairy of 699 milking cows, and a Potential Dairy of 2,000 milking cows (see Section 3.a of Table III-3).

b. Production

Raw Milk

The Dairy will increase Hawai‘i’s milk self-sufficiency and reduce fluid milk imports. At full operations with 699 cows, the Dairy will produce about 1.5 million gallons of raw milk per year, and will produce about 4.4 million gallons with 2,000 cows (see Table III-3, Section 3.a). This compares to about 4 million gallons produced in Hawai‘i in 2015. Production was down from a peak of about 18.3 million gallons in 1988 when Hawai‘i dairies supplied nearly all of the milk consumed in the state.

Livestock

In addition, the Dairy will increase the supply of livestock, including female calves for other dairies, male calves for beef ranching, and culled cows and heifers for beef or dairy operations.
c. Sales

At full operations of the 699-cow Dairy, annual direct-plus-indirect milk sales are estimated at about $10.1 million, of which about $8.1 million will be on Kaua‘i and about $2 million on O‘ahu (see Table III-3, Section 3.c).

Should HDF decide, in the future, to expand the herd up to 2,000 cow, annual sales are estimated as follows: about $23.3 million in direct and indirect sales on Kaua‘i, and about $5.7 million in indirect sales on O‘ahu, for a total of about $29 million.

d. Profits

At full operations, profits on direct and indirect sales are estimated at about $1 million per year for the 699-cow Dairy, and $2.9 million per year for the 2,000-cow Dairy (see Table III-3, Section 3.d). This includes estimated profits of: the Dairy, its subcontractors, companies supplying goods and services to the Dairy and to the families of Dairy workers, etc.

e. Employment

At full operations, the 699-cow Dairy will provide about 11 jobs on Kaua‘i, including about 5 farm jobs and about 6 indirect jobs (see Table III-3, Section 3.e). About 3 indirect jobs will be on O‘ahu. Thus, the Dairy will generate about 14 direct-plus-indirect jobs. Corresponding employment figures for the 2,000-cow Dairy are about double.

Dairy employment will include a farm manager, a marketing/community relations person, supervisors, and skilled and semi-skilled workers.

The employment figures are relatively low because the Dairy will be a modern facility with labor-savings devices which are needed to achieve profitable operations.

f. Payroll

Section 3.f of Table III-3 addresses payroll at full operations of the Dairy, although estimates are not shown in order to avoid disclosure.

For the Dairy jobs, annual salaries and wages will be competitive, and are expected to range from less than $40,000 to $115,000 or more. Because of the skill requirements for a modern dairy, the average wage for the Dairy is expected to exceed County-wide and State-wide averages. For the indirect jobs, wages will range from less than $30,000 annually to over $100,000.

g. Sources and Training of Farm Workers

As noted above, farm employment is expected to be relatively small: about 5 jobs for the 699-cow Dairy at full operations, and about 10 jobs for a 2000-cow operation. It is expected that most workers will be recruited from Kaua‘i. New workers will be trained by the Dairy.
h. Supported Population and Housing

At full operations, the 699-cow Dairy will provide about 31 direct-plus-indirect jobs for Hawai‘i residents who will live in about 11 homes (see Sections 3.g and 3.h of Table III-3). It is expected, that most of the workers will be Kaua‘i residents (about 25 residents in 9 homes). Corresponding figures for a 2,000-cow Dairy are about twice those of the 699-cow operation.

4. IMPACTS ON COUNTY REVENUES AND EXPENDITURES

The impact of the Dairy on County revenues and expenditures is shown in Table III-4. This table summarizes: (1) changes in the County’s tax and expenditure base, which is used to calculate revenues and expenditures; (2) revenues and expenditures related to Dairy development activities; and (3) revenues and expenditures related to full operations of the Dairy.

a. Development Activities

As shown in Table III-4, Section 4.b, development of the Dairy will result in a negligible impact on County finances. Unlike the State, County taxes on development activity are insignificant. Furthermore, the developer (not the County) will provide the required infrastructure: water, interior roads, waste disposal, drainage, etc. Also, construction companies provide their own security, sanitation, transportation, etc. Thus, few on-site services will be required from the County. And for the most part, construction workers already pay various County taxes, and already receive various County services.

b. Operations at Full Development

At full operations, the Dairy is expected to generate a net income to the County of about $51,000 for both the 699-cow Dairy and the 2,000-cow Dairy (see Table III-4, Section 4.c.). Most of the taxes will derive from property taxes on improvements. County property taxes on land—which are low when dedicated to agriculture—are already being paid, and are not expected to change significantly.

The Dairy will pay a variety of minor taxes and fees to the County (e.g., fuel and vehicle taxes), while requiring few County services.

Dairy workers and their families will pay a variety of taxes to the County, and will require County services. For these workers and families, the resulting net revenues are expected to be near zero but positive since the County budget is structured to break even and, on a per-capita basis, most Dairy workers will pay higher than average taxes since they will earn higher than average wages.
5. **Impacts on State Revenues and Expenditures**

The impact of the Dairy on State revenues and expenditures is shown in Table III-5. This table summarizes: (1) changes in the State’s tax and expenditure base which is used to calculate revenues and expenditures; (2) revenues and expenditures related to development activities; and (3) revenues and expenditures related to full operations of the Dairy.

**a. Development Activities**

Unlike the County, the State will derive significant revenues from development activity: a cumulative total of about $650,000 for both the 699-cow Dairy and the 2,000-cow Dairy (see Table III-5, Section 5.b). However, the revenues will be offset by the $1 million tax credit for improvements on land designated by the State Land Use Commission as Important Agricultural Lands.

Other than the IAL tax credit, State expenditures to support the development of the Dairy are expected to be negligible. As mentioned previously, HDF will provide the infrastructure for the Dairy. Also, construction activities require few on-site services from the State. And for the most part, construction workers already pay various State taxes, and already receive various State services.

**b. Operations at Full Development**

At full operations, the Dairy is expected to generate net income to the State that will exceed $60,000 per year for the 699-cow Dairy. Should HDF decide, in the future, to expand to a 2,000 cow Dairy, net income to the State would exceed $170,000 per year (see Table III-5, Section 5.c). Most of the revenues will derive from excise taxes on sales.

Similar to that for the County, the Dairy will pay a variety of minor taxes and fees to the State, while requiring few State services.

Also, Dairy workers and their families will pay a variety of taxes to the State, and will require State services. For these workers and families, the resulting net revenues are expected to be near zero but positive, since the State budget is structured to break even and, on a per-capita basis, most Dairy workers will pay higher than average taxes since they will earn higher than average wages.

6. **Other Benefits**

**a. Open Space**

The Dairy’s irrigated pastures will provide about 470 acres of well-maintained grassland divided into 119 fenced paddocks. The herd will be split into 6 groups, each of which will be rotated among the paddocks. Thus, at any given time, about 5% of the pasture land will be occupied by cows (6 of 119 paddocks), and about 95% will be unoccupied green
open space. In addition, about 77 acres will be used for cow raceways, internal roads, and setbacks along drainage ditches.

b. Potential Educational Tours

Although not currently planned, potential exists to add educational tours of the Dairy for school children, residents and visitors. This would provide an interesting learning experience about raw milk production, and possibly offer an additional activity for visitors to Kaua‘i. However, some additional building improvements would be required to accommodate tour groups.

7. Nuisance Issues and Impacts

Given the important economic, residential, and recreational role of the Kōloa-Poʻipū region, the Dairy must be compatible with, and not cause adverse impacts on regional resorts, commercial areas, homes, recreational activities, etc. If nuisance impacts were to occur—which is not expected—it could result in reduced tourism, sales, employment, salaries and wages, property values, personal wealth, State and County tax revenues, enjoyment of homes and recreational activities, etc. As mentioned previously, 36% of the island’s visitor units are in Po’ipū and Kukui‘ula, including the Grand Hyatt Kaua‘i Resort & Spa which is the largest employer in the County. Nuisance impacts on the economy, including property values, are addressed below.

a. Impacts of Concentrated Animal Feeding Operations on Property Values

A number of mainland studies have addressed the impact of large concentrated animal feeding operations (“CAFOs”) on property values of nearby homes (see listing in References). These operations, which are often called feedlots, confine a large number of animals—hogs, chickens, sheep, or cows—in a small area. Correspondingly, a large volume of manure is generated in a small area, leading to waste-management challenges.

Most CAFOs generate significant odors and other nuisance impacts (flies, dust, noise, runoff, etc.) that can extend beyond the CAFO property boundaries, thereby affecting nearby and downwind properties. Usually, but not always, property values of homes near CAFOs are lower than those of similar homes that are not affected by nuisance impacts of CAFOs. Relevant findings of the various studies, some of which are contradictory, include the following:

— Distance
  • Significantly lower home values can be limited to less than 1 mile from a CAFO, but some studies have found that lower values can extend beyond 3 miles.
  • Adverse impacts on home values diminish rapidly with distance from a CAFO.
— Size and Concentration
  • In general, larger CAFOs have a more negative effect on home values.
  • However, one study found the opposite to be true, with the possible explanation being that larger CAFOs tend to be newer, so have better manure-management facilities and use better practices.

— Animal Species
  • Most studies found that hog operations have a significant adverse impact on the value of nearby homes.
  • The findings on dairy operations are mixed. Some studies found that dairies lower home values significantly, especially those within 1 mile of a facility. But other studies have found that dairy operations, or a combination dairy/beef-cattle operation, can increase home values by adding a rural-lifestyle amenity.

— Management Practices
  • CAFOs with conservation plans have less of an impact on home values than CAFOs without them.

— Home Values
  • One study found that the less-expensive homes are less impacted by CAFOs than the expensive ones. Another study found the opposite.

— Employment Effect
  • In some cases, homes near a CAFO may increase in value due to the increased demand for homes by CAFO employees.

The above findings about the impacts of CAFOs on home values do not apply to the proposed Dairy for the following reasons:

— The HDF pasture system differs from a conventional dairy where cows are confined to barns. Instead of storing manure in lagoons and feeding silage (fermented vegetation) as forage, the Dairy will use rotational pasture-grazing where the animals are dispersed over a large expanse of grassland.

— Home values will not be affected because no noticeable odors, noise, flies, dust, runoff, or other nuisance impacts from the operation will extend to residential areas (see Subsections 7.c and 7.d). Instead, any noticeable nuisance impacts occurring beyond the Dairy property will be limited to the abutting farm and ranch lands which are owned by Māhāʻulepū Farm, lessor of the Dairy property.

b. Nuisance Impacts of Past and Current Agricultural Activities in Kōloa-Poipu

Unlike urban Honolulu and Waikiki, most of Kauaʻi and its resort areas—including Kōloa and Poʻipū—have a rural ambience. Most homes and visitor units on the island are within one mile of some agricultural activity. This rural character contributes to the charm
and appeal of the island. Some agricultural activities generated or currently generate significant nuisance impacts.

Sugar

Po‘ipū and Kōloa grew and thrived near sugar operations, which continued until 1996. Sugarcane fields bordered Kōloa to the east, north, and west, and bordered parts of Poʻipū. The Grand Hyatt Kaua‘i opened in 1992 while sugarcane was still being grown just mauka of the hotel property.

Sugarcane caused a number of nuisance impacts, including but not limited to: smoke when cane was burned prior to harvest, dust and soil runoff after fields were plowed, noise when fields were harvested, and field mice.

The large canehaul trucks created considerable noise, dust and cane litter. And the Kōloa Mill emitted odors, smoke, and noise. The distance from this mill to the the nearest homes in Kōloa is about 0.8 mile (versus about 2.3 miles for the Dairy facilities). For the nearest visitor units (the Grand Hyatt Kaua‘i), the distance is about 1.6 miles (versus about 2.5 miles for the Dairy facilities).

The nuisance impacts of past sugar operations far exceed the impacts anticipated for the Dairy. Also, these impacts from sugar operations extended to the Kōloa and Poʻipū communities, which will not be the case for the Dairy (see Subsection 7.c).

Seed Crops

From 1996 to 2015, seed crops had a major presence in Kōloa-Poʻipū, with over 1,000 acres used by Dupont Pioneer in 2015 (see Figure II-3). This included land adjacent to the Poʻipū Bay Resort Golf Course, which is the golf course for the Grand Hyatt Kaua‘i. Pioneer recently returned its lease land to Māhāʻulepū Farm.

The seed companies generally farm plots of 1 to 5 acres surrounded by a buffer zone to protect planted areas from pollen drift. Cover crops are often planted to build soil fertility and reduce windblown dust.

Nevertheless, one of more significant nuisance impacts of seed crops is windblown dust. Dust from the Dairy’s pastureland will not be a problem since the fields will be kept in grass, won’t be plowed, and soil will not be left exposed even for short periods.

Beef Cattle

With the demise of sugar and seed crops in Kōloa and Poʻipū, the cattle grazing for the beef market is now the dominant use of agricultural land in the region (see Figure II-3). Grazing lands to the east, north and west of Kōloa total over 2,900 acres, which is reduced
from over 3,300 acres before Māhāʻulepū Valley was leased for the Dairy. In the near term, grazing is likely to expand onto most of the lands used recently for seed crops.

Grazing cattle for the beef market is known as cow-and-calf operations. When the calves reach about 500 pounds, most are shipped to the mainland for finishing. Over 700 cow-and-calf units graze on the land in the region, down from over 800 units before Māhāʻulepū Valley was leased for the Dairy.

Grazing of cattle for the beef market usually uses rotational pasture grazing similar to that planned for the Dairy, with the cattle rotated every 18 to 30 days, depending on the ranch and pasture. But because the pastures for beef cattle are not irrigated nor fertilized, the carrying capacity of the land is less than that for the proposed Dairy; the paddocks are larger; and the animal densities are less.

Grazing cattle near communities is common throughout Hawai‘i, including but not limited to the following:

— Kaua‘i: Hanalei, Hanapēpē, Kalâheo, Kapa‘a, Kukui‘ula, Wailuā
— O‘ahu: Ko ‘Olina, Makakilo, Lā‘ie, Waimānalo, Waipi‘o
— Moloka‘i: Kaunakakai, Maunaloa
— Maui: Hāna, Kīhei, Kula, Makawao, Mākena, Wailuā
— Big Island: Hawi, Honoka‘a, Laupāhoehoe, Mountain View, Nā‘ālehu, South Hilo, Waimea, Wood Valley

A number of these communities feature expensive homes, and some are resort or resort-residential communities (Kukui‘ula and Wailuā on Kaua‘i; Ko ‘Olina on O‘ahu; and Kīhei, Mākena, and Wailuā on Maui).

In Kōloa and Po‘ipū, grazing occurs less than 200 feet from some homes, less than 1 mile from some visitor units, less than one-third of mile to the east and west of the main commercial area of Kōloa, and less than 200 feet from a golf course.

Many of the homes in the region that are near cattle operations are in the northeast and eastern sections of Kōloa (Areas A, B and C in Figure II-5). As indicated in Table II-8, most of the homes are old (built before 1980), and most are of modest size (less than 1,200 sq. ft.). For these areas, the 2016 median assessed values are as follows:

— Area A: $567,500
— Area B: $406,100
— Area C: $471,100

Homes in West Kōloa are also near cattle grazing (Area H of Figure II-6). This neighborhood has a mix of older and smaller homes, and newer and larger homes (see Table II-8). The 2016 median assessed values are $464,150 for a residential lot and $788,200 for a single-family home.
At the western end of Po‘ipū is Kukui‘ula—a luxury residential community that abuts grazing land (Areas I, J and K in Figure II-6). Much of the grazing land is owned by the development company or an affiliated company. Most of the homes are new (built after 2012), and most are large (over 2,100 sq. ft.). For 2016, median assessed values of residential lots and homes are as follows:

- Area I: $1,297,150 for a lot and $2,462,400 for a home
- Area J: $641,400 for a lot and $2,582,000 for a home
- Area K: $2,893,100 for a home

Clearly, beef cattle operations are compatible with nearby homes, commercial areas, resorts, and recreational activities. Although stocking densities are lower for beef cattle on unirrigated pastures than they are for the proposed Dairy on irrigated pastures, the operations are similar: cattle are rotated among pastures as limited by the carrying capacity of the land for feed, reabsorption of nutrients, erosion control, etc.

**Feral Chickens**

Although few (if any) commercial poultry farms remain on Kaua‘i, former farms have left an impact in terms of feral chickens which are now ubiquitous on the island. While colorful and adding to the rural ambience, they create two nuisance problems: (1) the roosters start crowing about 2 hours before daybreak, and continue to crow occasionally during the day and into the night; and (2) chicken dung provides a breeding ground for flies.

The Dairy will not create animal noises that can be heard in resort, commercial, residential or recreational areas, and the flies will be controlled (see Subsection 7.c).

**Application of Reclaimed Wastewater and Nutrients**

Reclaimed wastewater is used for irrigating farmlands and golf courses throughout Hawai‘i, including golf courses in Po‘ipū. In 2013, the Limticao Consulting Group reported that the Po‘ipū Bay Resort Golf Course, which is the golf course for the Grand Hyatt Kaua‘i, uses a mix of 20% to 40% R-2 rated wastewater. However, a mix of up to 60% wastewater is used on the first three holes, resulting in a slight odor during spraying. For the Dairy, the mix will be less than 8%.

The Kiahuna Golf Course uses a mix of 40% to 60% R-1 rated wastewater, which is cleaner than R-2 rated water. The fairways of the course are lined with single-family homes which, for homes on the east side of the project, have a median assessed value exceeding about $1.16 million (see Figure II-X and Area D Table II-8).

The nutrients in the sludge from wastewater treatments plants may also be reclaimed. From 2003 to 2014, Aqua Engineers applied sludge to about 45 acres of forage grass in Māhā‘ulepū. The land bordered Po‘ipū Road about 1 mile northeast of the Grand Hyatt Resort, and within about 500 feet of the 12th green of its golf course. Aqua Engineers reports
that there were no complaints about odors or other nuisance impacts, and no adverse health or environmental impacts. Nevertheless, the operation was forced to close due to community concerns that it was contributing to high levels of *enterococci* bacteria in Waiopili Ditch which passes about a half-mile to the east of the former sludge-disposal site. In a 2016 report, the DOH found high levels of *enterococci* bacteria in the Ditch after the sludge operation ceased, and determined that the bacteria came from a number of upstream and in-stream sources (see Subsection 7.c below).

These examples indicate that properly managed reclaimed wastewater and nutrients can be compatible with high-end resorts, homes, and recreational areas.

c. **Nuisance Impacts**

This section summarizes the anticipated economic impacts of nuisance issues due to the Dairy. The information is based on the various environmental studies conducted in preparation of an Environmental Impact Statement.

**Overview**

The Dairy will feature rotational pasture-grazing along with modern facilities and practices, and will comply with all applicable Federal and State environmental standards. In addition, conditions at the Dairy will be monitored continually to ensure that adverse impacts will not occur, or will be mitigated to minimize adverse impacts.

Considerable distances will separate the Dairy from the resorts, commercial areas, homes and recreational areas. The nearest resort units are about 1.5 miles from a Dairy paddock and about 2.4 miles from the Dairy milking parlor (see Figure II-4). For the Kōloa town center, the distances from the closest paddock and dairy facilities are about 2.2 and 2.8 miles, respectively. For homes, the distances are about 1 and 2 miles away, respectively. And for recreational activities, the distances are about 0.6 mile and 1.3 miles, respectively.

Winds in the region are generally from the east-northeast (normal tradewinds) and range from 5 to 15 miles per hour. The tradewinds blow across the Dairy property and toward Poʻipū, but not toward Kōloa.

Given the plans for the Dairy and its location, environmental studies indicate that no noticeable noise, dust, odors, flies, runoff, or other nuisance impacts will extend to resort, commercial, residential or recreational areas. Noticeable nuisance impacts occurring outside the Dairy property will be limited to the abutting farm and ranch lands which are owned by Māhāʻulepū Farm, the lessor of the Dairy property.

**Noise**

Most of the noise from milking and related operations will be contained within the milking parlor and other buildings, while noise from tractors and other field equipment will
occur mostly during the daylight hours. Some farmers and ranch hands on abutting lands may hear noises from Dairy operations. But the resorts, stores, homes and recreational areas are too distant from the Dairy for visitors and residents to be adversely affected by the noise.

**Dust**

Dust will be generated as cows move along soft limestone raceways that connect the paddocks and lead to and from the milking parlor. As case with noise, resorts, stores, homes and recreational areas are too distant for visitors and residents to be adversely affected by dust from Dairy operations.

The Dairy will generate far less dust than was the case when sugarcane was grown in the Kōloa-Poʻipū region, and much less dust than typical field farming. Both of these agricultural activities generate considerable dust during plowing, followed by weeks or months of occasional dust when soils are left exposed. The Dairy pasture will not be plowed, and the soils will not be left exposed.

**Odors**

Potential sources of odor from the Dairy include (1) manure deposited by cows in the milking parlor and holding pens; (2) the two effluent ponds; (3) the irrigation system (which uses effluent); and (4) the manure deposited directly onto the pasture. The manure from the milking parlor and holding pen will be collected frequently and washed into a settling pond that will be aerated to reduce odors. The resulting effluent will be pumped into a storage pond and then used to irrigate the pasture diluted with water from the Waitā Reservoir. To further reduce odors from the Dairy effluent ponds and other facilities, ironwood trees will be planted along the east-southeast boundary of the property.

The majority of manure (about 90%) will be deposited directly onto the pasture where—with the help of cattle egrets and dung beetles—it will break down quickly and provide nutrients to the pasture.

Figures III-1 and III-2 show odor-detection limits for the 699-cow Dairy and the 2,000-cow Dairy, respectively. For people who are sensitive to odors, the limits indicate where 50 percent of them would detect an odor from the Dairy at an average rate of once every 200 hours. The figures are based on an unlikely confluence of worst-case weather conditions and other factors. Thus, in practice, the odor limits are likely to extend a shorter distance.

For the 699-cow Dairy, the odor detection limit extends about 1,670 feet (about one-third mile) outside the Dairy boundary, and about 2,780-feet (about half mile) for the 2,000-cow Dairy. All of the affected area occurs on land owned by Māhāʻulepū Farm.

As above, resorts, stores, homes and recreational areas are too distant for visitors and residents to be adversely affected by odors from Dairy operations.
**Flies**

Fly populations at the Dairy will be controlled through Integrated Pest Management whereby fly reproduction will be disrupted at key points in the life cycle. Cattle egrets break up the cow patties while searching for prey, and dung beetles bury cow patties in 1 to 3 days. This interrupts the egg-to-fly lifecycle, which ranges from 7 to 20 days depending upon the species of fly. Kauaʻi has 14 dung beetle species, some of which fly at night and some during the day, and some that prefer older manure over fresh.

Supplemental pest control may be used to prevent short-term spikes in fly populations. These could include: sticky tapes or ribbons in the milking parlor and covered areas, outdoor traps, non-toxic repellants, etc. Insecticides are non-discriminatory and kill beneficial as well as pest insects. Such control would only be used when needed by those qualified to apply chemicals, and in accordance with authorized procedures and regulatory labeling requirements.

The Dairy will not encourage or maintain any populations of dogs, cats or chickens at the Dairy because their dung would facilitate breeding of several species of flies that are not currently established on the property. While feral chickens are common throughout Kauaʻi, the Dairy will diligently clean up any spilled feed or other potential attractants to keep chickens away from the Dairy facilities.

In order to avoid rotting garbage that might provide attractive habitat for fly breeding, food waste of on-site workers will be disposed of in covered, lined containers and removed from the site often. Spilled or waste supplement foods for the cows will not be allowed to become wet and stay exposed. And Dairy workers will remove trash found on roads abutting or near the property so that flies do not breed in garbage, and migrate to the Dairy.

In Kōloa and Poʻipū, flies depend upon local food and breeding sources, such as dog, cat, and chicken dung; rotting fruits and vegetables; exposed garbage; and damp and decaying organic matter. Given the controls that are planned for the Dairy, it is not expected to add to existing fly problems in Kōloa and Poʻipū.

**Runoff**

Several intermittent streams drain the southern slopes of Hāʻupu Ridge and converge into man-made ditches that run through the Dairy property into the concrete-lined Waipōlī Ditch. This ditch parallels lower Māhāʻulepū Road and is fed by another ditch from the west. Waipōlī Ditch continues southward, terminating at a deep and muddy basin where the ditch water joins the ocean via a channel cut through the beach sand. Mixing of the ditch water with ocean water occurs rapidly just a short distance from the shoreline.

Waipōlī Ditch receives runoff from a 2,700-acre sub-watershed, including the runoff from lands mauka and makai of the Dairy. The Dairy property accounts for about 20% of the subwatershed.
Figure III-1. Odor Detection Limit for 699-cow Dairy
Figure III-2. Odor Detection Limit for 2,000-cow Dairy
Environmental sampling by DOH has identified high levels of *enterococci* bacteria in Waiopili Ditch, particularly near its ocean terminus. According to a 2016 report by DOH, the bacteria appear to originate upstream from feral animals (pigs and some cats and dogs), avian wildlife, domesticated sheep, beef cattle on the slopes of Hāʻupu Ridge, decaying organic matter, vegetation, soils and insects. Two conditions block ultraviolet light that would otherwise reduce bacteria levels: the dense canopy along the makai end of Waiopili Ditch, and the turbidity of the water. Also, the particles that cause turbidity help transport bacteria downstream.

The Dairy is expected to contribute little runoff of soil particles, nutrients, organic debris, pathogens, etc. Cow excretions in the pasture and the effluent applied to pasture will be absorbed quickly by a thick thatch of pasture grass—essentially an organic net. Due to the high moisture and moderate temperatures in the thatch, the microbial activity is very high, and most of the effluent will be broken down by microbial activity within one day, after which the pasture grass will absorb the released nutrients.

Additional measures to prevent or minimize runoff from the Dairy will include:

— Fenced 35-foot-wide vegetation buffers on both sides of drainage ditches to keep cows away from the ditches and to filter water draining into the ditches.
— No application of effluent within 50 feet of drainage ditches.
— No application of effluent to the pasture before or during rainstorms that could result in runoff, or when the soil is completely saturated.
— Ongoing monitoring of surface and coastal waters to gauge whether nutrients and pathogens are reaching levels of concern.

Compared to the current situation, the Dairy will result in a reduction in the runoff from the property of soil particles, nutrients, organic debris, pathogens, etc. In turn, this will result in improved water quality for the affected drainage ditches. However, during rainstorms, nutrient runoff could increase for the 2,000-cow Dairy, but this will not degrade nearshore waters significantly since the nutrients will be diluted with rainwater, then will quickly be dispersed by wave action and ocean currents. Also, the health risk of cattle-fecal contaminate is low, about 0.7% to 4% of that of human-fecal contaminate. In any case, substantial runoff will continue to occur for the 80% of the subwatershed not occupied by the Dairy.

The drainage ditches are not recreational resources used by the public, even near the terminus of Waiopili Ditch at the ocean. Thus, any change in water quality—either positive or negative—will affect neither residents nor visitors.

d. Economic Impacts from Nuisances

As summarized above, no noticeable noise, dust, odors, flies, runoff, or other nuisance impacts from the Dairy will extend to resort, commercial, residential or recreational areas. Noticeable nuisance impacts occurring outside the Dairy property will be limited to the
abutting farm and ranch lands which are owned by Māhāʻulepū Farm, the lessor of the Dairy property. These abutting lands are designated IAL, so they will remain in agriculture for the foreseeable future.

Consequently, the Dairy will not adversely affect:

— Guests of resorts in the Kōloa-Po‘ipū region.
— Recreational activities in the region.
— The regional economy (number of visitors, visitor expenditures, retail sales, employment, incomes, etc.)
— Residents when at home in the region.
— Property sales in the region (single-family homes, condominiums, second homes, time-share units, etc.).
— Values of properties in the region.
— County or State taxes derived from residents, resorts, or commercial activities in the region.

From a broader perspective, the Dairy will help maintain the existing rural character and ambience of the Kōloa-Po‘ipū region.

8. Summary of Significant Benefits and Impacts

The primary economic benefits of the Dairy will include:

— For Hawai‘i, increased milk self-sufficiency by about 1.5 million gallons per year for the 669-cow Dairy, and about 4.4 million gallons should HDF decide, in the future, to expand to a 2,000-cows Dairy.
— At full operations and depending on the eventual size of the Dairy, about 14 to 28 additional jobs, including about 5 to 10 well-paying farm jobs.
— Preservation of about 547 acres of well-maintained green open space.

No adverse economic impacts due to nuisance issues are anticipated.
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TABLES FOR PART II
Table II-1. Demographic Characteristics, Kauai and Koloa-Poipu: 2000 and 2009-2013 Estimates

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<tr>
<th>Item</th>
<th>Kauai</th>
<th>Koloa-Poipu</th>
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<td>(2010 count, residents &amp; visitors)</td>
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Sources

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<td>Elementary and High School</td>
<td>12,272</td>
<td>10,828</td>
<td>-11.8%</td>
<td>1,051</td>
<td>816</td>
<td>-22.4%</td>
</tr>
<tr>
<td>College</td>
<td>1,736</td>
<td>2,947</td>
<td>69.8%</td>
<td>160</td>
<td>213</td>
<td>33.1%</td>
</tr>
<tr>
<td>Total School Enrollment</td>
<td>14,881</td>
<td>14,736</td>
<td>-1.0%</td>
<td>1,273</td>
<td>1,095</td>
<td>-14.0%</td>
</tr>
<tr>
<td><strong>English Language Skills, Age 5 and Over</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English Only</td>
<td>44,111</td>
<td>50,194</td>
<td>13.8%</td>
<td>4,179</td>
<td>4,530</td>
<td>8.4%</td>
</tr>
<tr>
<td>Language Other Than English</td>
<td>10,711</td>
<td>13,280</td>
<td>24.0%</td>
<td>909</td>
<td>1,007</td>
<td>10.8%</td>
</tr>
<tr>
<td>Speak English Very Well</td>
<td>5,924</td>
<td>8,258</td>
<td>39.4%</td>
<td>460</td>
<td>573</td>
<td>24.6%</td>
</tr>
<tr>
<td>Speak English Less than Very Well</td>
<td>4,787</td>
<td>5,022</td>
<td>3.9%</td>
<td>449</td>
<td>434</td>
<td>-3.3%</td>
</tr>
<tr>
<td>Total Population, Age 5 and Over</td>
<td>54,822</td>
<td>63,474</td>
<td>15.8%</td>
<td>5,088</td>
<td>5,537</td>
<td>8.8%</td>
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<tr>
<td><strong>Distribution</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>English Only</td>
<td>80.5%</td>
<td>79.1%</td>
<td></td>
<td>82.1%</td>
<td>81.8%</td>
<td></td>
</tr>
<tr>
<td>Language Other Than English</td>
<td>19.5%</td>
<td>20.9%</td>
<td></td>
<td>17.9%</td>
<td>18.2%</td>
<td></td>
</tr>
<tr>
<td>Speak English Well or Very Well</td>
<td>10.8%</td>
<td>13.0%</td>
<td></td>
<td>9.0%</td>
<td>10.3%</td>
<td></td>
</tr>
<tr>
<td>Speak English Poorly</td>
<td>8.7%</td>
<td>7.9%</td>
<td></td>
<td>8.8%</td>
<td>7.8%</td>
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**Sources**
Table II-3. Economic Characteristics, Kauai 2000, 2014 and 2030

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<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Tourism</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Visitors</td>
<td>1,074,821</td>
<td>1,113,605</td>
<td>3.6%</td>
<td>1,330,000</td>
<td>19.4%</td>
</tr>
<tr>
<td>Visitor Spending ($million)</td>
<td>$1,200</td>
<td>$1,466</td>
<td>22.2%</td>
<td>$1,358</td>
<td>-7.4%</td>
</tr>
<tr>
<td>Lodging Units</td>
<td>7,159</td>
<td>8,492</td>
<td>18.6%</td>
<td>9,690</td>
<td>14.1%</td>
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<tr>
<td><strong>Labor</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Civilian Labor Force</td>
<td>30,250</td>
<td>34,600</td>
<td>14.4%</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Employed</td>
<td>28,750</td>
<td>32,950</td>
<td>14.6%</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>Unemployment Rate</td>
<td>4.8%</td>
<td>4.9%</td>
<td>2.1%</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Jobs, Wage and Salary Only</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nat. Resources &amp; Mining &amp; Construction</td>
<td>1,100</td>
<td>1,200</td>
<td>9.1%</td>
<td>1,850</td>
<td>54.2%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>400</td>
<td>400</td>
<td>0.0%</td>
<td>300</td>
<td>-25.0%</td>
</tr>
<tr>
<td>Trade, Transportation &amp; Utilities</td>
<td>5,600</td>
<td>5,800</td>
<td>3.6%</td>
<td>6,180</td>
<td>6.6%</td>
</tr>
<tr>
<td>Information</td>
<td>400</td>
<td>200</td>
<td>-50.0%</td>
<td>290</td>
<td>45.0%</td>
</tr>
<tr>
<td>Financial Activities</td>
<td>1,200</td>
<td>1,400</td>
<td>16.7%</td>
<td>1,180</td>
<td>-15.7%</td>
</tr>
<tr>
<td>Professional &amp; Business Services</td>
<td>2,200</td>
<td>2,800</td>
<td>27.3%</td>
<td>3,690</td>
<td>31.8%</td>
</tr>
<tr>
<td>Education &amp; Health Services</td>
<td>2,100</td>
<td>2,700</td>
<td>28.6%</td>
<td>3,660</td>
<td>35.6%</td>
</tr>
<tr>
<td>Leisure and Hospitality</td>
<td>7,800</td>
<td>9,300</td>
<td>19.2%</td>
<td>9,180</td>
<td>-1.3%</td>
</tr>
<tr>
<td>Other Services</td>
<td>700</td>
<td>1,000</td>
<td>42.9%</td>
<td>1,260</td>
<td>26.0%</td>
</tr>
<tr>
<td>Government</td>
<td>4,100</td>
<td>4,600</td>
<td>12.2%</td>
<td>5,610</td>
<td>22.0%</td>
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<tr>
<td>Agriculture</td>
<td>950</td>
<td>n/a</td>
<td>n/a</td>
<td>810</td>
<td>n/a</td>
</tr>
</tbody>
</table>

n/a = not available

**Sources**
- Department of Labor and Industrial Relations. Job Count by Industry. 2014.
- Department of Labor and Industrial Relations. Historic Labor Force Estimates. 2014.
### Table II-4. Visitor Plant Inventory, Kauai: 2015

<table>
<thead>
<tr>
<th>Item</th>
<th>Properties</th>
<th>Units</th>
<th>Properties</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apartment Hotel</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bed &amp; Breakfast</td>
<td>12</td>
<td>56</td>
<td>2</td>
<td>24</td>
</tr>
<tr>
<td>Condominium Hotel</td>
<td>22</td>
<td>1,387</td>
<td>11</td>
<td>608</td>
</tr>
<tr>
<td>Hostel</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hotel</td>
<td>15</td>
<td>2,667</td>
<td>4</td>
<td>1,124</td>
</tr>
<tr>
<td>Vacation Rentals*</td>
<td>265</td>
<td>1,800</td>
<td>110</td>
<td>677</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>40</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Timeshare</td>
<td>21</td>
<td>2,632</td>
<td>3</td>
<td>625</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>339</strong></td>
<td><strong>8,582</strong></td>
<td><strong>130</strong></td>
<td><strong>3,058</strong></td>
</tr>
<tr>
<td>Island Share</td>
<td></td>
<td></td>
<td></td>
<td>36%</td>
</tr>
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</table>

**Source**
Hawaii Tourism Authority. "2015 Visitor Plant Inventory."
<table>
<thead>
<tr>
<th>Item</th>
<th>1980</th>
<th>2015</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Crops</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Plantation Crops</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pineapple</td>
<td>20</td>
<td>-</td>
<td>(20)</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>53,596</td>
<td>-</td>
<td>(53,596)</td>
</tr>
<tr>
<td><strong>Total Plantation Crops</strong></td>
<td>53,616</td>
<td>-</td>
<td>(53,616)</td>
</tr>
<tr>
<td><strong>Large-acreage Diversified Crops</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coffee</td>
<td>-</td>
<td>3,788</td>
<td>3,788</td>
</tr>
<tr>
<td>Macadamia Nuts</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Seed Crops</td>
<td>-</td>
<td>13,299</td>
<td>13,299</td>
</tr>
<tr>
<td><strong>Total Other Large-acreage Export Crops</strong></td>
<td>-</td>
<td>17,087</td>
<td>17,087</td>
</tr>
<tr>
<td><strong>Other Diversified Crops</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquaculture</td>
<td>95</td>
<td>183</td>
<td>88</td>
</tr>
<tr>
<td>Bananas</td>
<td>505</td>
<td>26</td>
<td>(479)</td>
</tr>
<tr>
<td>Flowers, Foliage and Landscape Crops</td>
<td>30</td>
<td>165</td>
<td>135</td>
</tr>
<tr>
<td>Forage and Grain</td>
<td>245</td>
<td>-</td>
<td>(245)</td>
</tr>
<tr>
<td>Guava (for 2015, included with Other Div. Crops)</td>
<td>343</td>
<td>-</td>
<td>(343)</td>
</tr>
<tr>
<td>Papaya (for 2015, included with Other Div. Crops)</td>
<td>750</td>
<td>-</td>
<td>(750)</td>
</tr>
<tr>
<td>Taro/Wetland Crops</td>
<td>322</td>
<td>443</td>
<td>121</td>
</tr>
<tr>
<td>Tropical Fruits (for 1980 included with Other Div. Crops)</td>
<td>-</td>
<td>463</td>
<td>463</td>
</tr>
<tr>
<td>Vegetable/Melon (for 2015, included with Other Div. Crops)</td>
<td>80</td>
<td>-</td>
<td>(80)</td>
</tr>
<tr>
<td>Other Crops</td>
<td>582</td>
<td>1,199</td>
<td>617</td>
</tr>
<tr>
<td><strong>Total Diversified Crops</strong></td>
<td>2,952</td>
<td>2,479</td>
<td>(473)</td>
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<tr>
<td><strong>Total Crops</strong></td>
<td>56,568</td>
<td>19,566</td>
<td>(37,002)</td>
</tr>
</tbody>
</table>

| **Intensive Livestock**                        |      |      |        |
| Dairy                                          | 208  | -    | (208)  |
| Hog                                            | 28   | -    | (28)   |
| Poultry                                        | 19   | -    | (19)   |
| **Total Intensive Livestock**                  | 255  | -    | (255)  |

| **Commercial Forests**                        |      | 1,743 | 1,743 |
| **Grazing/Pasture**                            | 28,898 | 41,934 | 13,036 |
| **Total Agriculture and Forestry**            | 85,721 | 63,243 | (22,478) |

**Source**
Jeffery Melrose, et. al. "Statewide Agricultural Land Use Baseline 2015."
Table II-6. Jobs by Industry, Kauai and Koloa-Poipu: 2011

<table>
<thead>
<tr>
<th>Item</th>
<th>Kauai Jobs</th>
<th>Koloa-Poipu Jobs</th>
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</thead>
<tbody>
<tr>
<td>Natural Resources, Mining &amp; Construction</td>
<td>1,300</td>
<td>129</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>300</td>
<td>20</td>
</tr>
<tr>
<td>Trade, Transportation &amp; Utilities</td>
<td>5,600</td>
<td>458</td>
</tr>
<tr>
<td>Information</td>
<td>200</td>
<td>36</td>
</tr>
<tr>
<td>Financial Activities</td>
<td>1,200</td>
<td>50</td>
</tr>
<tr>
<td>Professional &amp; Business Services</td>
<td>2,900</td>
<td>91</td>
</tr>
<tr>
<td>Education &amp; Health Services</td>
<td>2,500</td>
<td>130</td>
</tr>
<tr>
<td>Leisure and Hospitality</td>
<td>8,300</td>
<td>2,618</td>
</tr>
<tr>
<td>Other Services</td>
<td>1,000</td>
<td>182</td>
</tr>
<tr>
<td>Government</td>
<td>4,400</td>
<td>32</td>
</tr>
<tr>
<td>Agriculture</td>
<td>600</td>
<td>6</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>28,300</strong></td>
<td><strong>3,752</strong></td>
</tr>
</tbody>
</table>

Sources
Department of Labor and Industrial Relations. Job Count by Industry. 2014.
## Table II-7. Home Sale Prices, Kauai and Koloa-Poipu: 2013 to 2015

<table>
<thead>
<tr>
<th>Item</th>
<th>Kauai</th>
<th>Koloa-Poipu</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sales</td>
<td>Median Price</td>
</tr>
<tr>
<td>Single Family Residences</td>
<td>2013</td>
<td>447</td>
</tr>
<tr>
<td></td>
<td>2014</td>
<td>467</td>
</tr>
<tr>
<td></td>
<td>2015</td>
<td>487</td>
</tr>
<tr>
<td>Condominiums</td>
<td>2013</td>
<td>351</td>
</tr>
<tr>
<td></td>
<td>2014</td>
<td>327</td>
</tr>
<tr>
<td></td>
<td>2015</td>
<td>362</td>
</tr>
</tbody>
</table>

Source
Locations Hawaii. 2016.
### Table II-8. Assessed Values of Select Properties, Koloa and Poipu: 2016

(Assessed values of specified properties and areas are shown in Figures II-5 and II-6)

<table>
<thead>
<tr>
<th>Area and TMK</th>
<th>Type of Property</th>
<th>Vacant</th>
<th>Acres</th>
<th>Year Built</th>
<th>Bedrooms</th>
<th>Bathrooms (Full)</th>
<th>Building Sq. Ft.</th>
<th>Assessed Value (2016)</th>
</tr>
</thead>
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<td></td>
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<td></td>
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<td>428002014</td>
<td>SFR</td>
<td>N</td>
<td>0.75</td>
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<td>5</td>
<td>3</td>
<td>2,426</td>
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<td>SFR</td>
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<td>0.5</td>
<td>1926</td>
<td>3</td>
<td>1</td>
<td>1,018</td>
<td>$455,000</td>
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<td>428002016</td>
<td>SFR</td>
<td>N</td>
<td>0.62</td>
<td>1926</td>
<td>4</td>
<td>1</td>
<td>1,732</td>
<td>$496,300</td>
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<td>428002017</td>
<td>SFR</td>
<td>N</td>
<td>0.59</td>
<td>1926</td>
<td>3</td>
<td>2</td>
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<td>3</td>
<td>2,177</td>
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<td>SFR</td>
<td>N</td>
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<td>1920</td>
<td>4</td>
<td>3</td>
<td>2,586</td>
<td>$638,800</td>
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<td>Median</td>
<td>Vacant</td>
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<td></td>
<td>$567,550</td>
</tr>
<tr>
<td></td>
<td>Developed</td>
<td></td>
<td>0.61</td>
<td>1926</td>
<td>4.0</td>
<td>2.5</td>
<td>2,060</td>
<td>$567,550</td>
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<tr>
<td>Area B</td>
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<td>428002006</td>
<td>SFR</td>
<td>N</td>
<td>0.19</td>
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<td>1,152</td>
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<td>0.18</td>
<td>1979</td>
<td>3</td>
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<td>720</td>
<td>$342,600</td>
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<td>1</td>
<td>924</td>
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<td>428002009</td>
<td>SFR</td>
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<td>0.22</td>
<td>1964</td>
<td>3</td>
<td>1</td>
<td>1,712</td>
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<td>0.16</td>
<td>1993</td>
<td>3</td>
<td>4</td>
<td>1,988</td>
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<td>SFR</td>
<td>N</td>
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<td>1926</td>
<td>5</td>
<td>3</td>
<td>2,145</td>
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</tr>
<tr>
<td>428003040</td>
<td>SFR</td>
<td>N</td>
<td>0.23</td>
<td>2003</td>
<td>2</td>
<td>2</td>
<td>1,244</td>
<td>$462,100</td>
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<tr>
<td>428025024</td>
<td>SFR</td>
<td>N</td>
<td>0.23</td>
<td>1971</td>
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<td>1</td>
<td>1,040</td>
<td>$431,000</td>
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<td>SFR</td>
<td>N</td>
<td>0.24</td>
<td>1970</td>
<td>4</td>
<td>2</td>
<td>1,421</td>
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<td>0.21</td>
<td>1975</td>
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Table II-8. Assessed Values of Select Properties, Koloa and Poipu: 2016  
(Assessed values of specified properties and areas are shown in Figures II-5 and II-6)

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Vacant: 0.25
Developed: 0.25 2006 3.0 3.0 2,432 $1,159,400

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<th>Building Sq. Ft.</th>
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Table II-8. Assessed Values of Select Properties, Koloa and Poipu: 2016

(Assessed values of specified properties and areas are shown in Figures II-5 and II-6)

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Median Vacant

Vacant

Median Developed

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Table II-8. Assessed Values of Select Properties, Koloa and Poipu: 2016
(Assessed values of specified properties and areas are shown in Figures II-5 and II-6)

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Table II-8. Assessed Values of Select Properties, Koloa and Poipu: 2016

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## Table II-8. Assessed Values of Select Properties, Koloa and Poipu: 2016

( Assess values of specified properties and areas are shown in Figures II-5 and II-6 )

<table>
<thead>
<tr>
<th>Area and TMK</th>
<th>Type of Property</th>
<th>Vacant</th>
<th>Acres</th>
<th>Year Built</th>
<th>Bedrooms (Full)</th>
<th>Building Sq. Ft.</th>
<th>Assessed Value (2016)</th>
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### Area K

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### Kukuiula (Areas I, J, K)

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<th>Acres</th>
<th>Year Built</th>
<th>Bedrooms (Full)</th>
<th>BuildingSq. Ft.</th>
<th>Assessed Value (2016)</th>
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<td>3</td>
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<td>2,104</td>
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Sources:
CoreLogic. 2016.
County of Kauai. 2016.

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<td>24.2%</td>
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<td>Koloa-Poipu &amp; Eleele-Kalaheo</td>
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<td>15,737</td>
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<td>36%</td>
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<td>21%</td>
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<td>22%</td>
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<td>18%</td>
<td></td>
<td>20%</td>
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<td>Koloa-Poipu &amp; Eleele-Kalaheo</td>
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<td>5,764</td>
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<td>34.7%</td>
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<td>23%</td>
<td>19%</td>
<td></td>
<td>21%</td>
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<td>Koloa-Poipu &amp; Eleele-Kalaheo</td>
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<td>5,692</td>
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<td>17%</td>
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<td>1,033,000</td>
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<td><strong>Visitor Units</strong></td>
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Source
TABLES FOR PART III
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<th>Initial Dairy</th>
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<td>*</td>
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<td>-</td>
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<td>Cow Raceways, Roads &amp; Setbacks</td>
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<td>77</td>
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<td>Milking Cows</td>
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<td>118</td>
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<td>In-shed feeding and silos</td>
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<td>Implement shed &amp; workshop</td>
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<td>Mobile tankers, refrigeration, heating</td>
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### 2.a. CONSTRUCTION PERIOD
- **Years:** 2

### 2.b. CONSTRUCTION EXPENDITURES
- **Total Construction Expenditures:** $7,500,000
- **Annual Construction Expenditures (average):** $3,750,000

### 2.c. EQUIPMENT EXPENDITURES
- **Total Expenditures on Equipment:** $2,000,000
- **Annual Equipment Expenditures (average):** $1,000,000

### 2.d. INDIRECT SALES GENERATED BY CONSTRUCTION
- **Kauai:** 117% of const. exp. (117% of construction expenditures), $2,851,875 per year
  - 65% on Kauai, $1,535,625 per year
- **Oahu:** 117% of const. exp. (117% of construction expenditures), $1,535,625 per year
  - 35% on Oahu, $913,750 per year
- **Total Indirect Sales:** $4,387,500 per year

### 2.e. SUMMARY OF EXPENDITURES & SALES
- **Final Sales (taxed at 4%)**
  - **Construction Expenditures:** $3,750,000 per year
  - **Equipment Expenditures:** $1,000,000 per year
  - **Consumption Expenditures:** 55% of payroll, $944,548 per year
  - **Total Sales at 4%:** $5,694,548 per year
- **Intermediate Sales (taxed at 0.5%)**
  - **Indirect Sales Related to Construction:** $4,387,500 per year
  - **Less Consumption:** $944,548 per year
  - **Total Sales at 0.5%:** $3,442,952 per year
- **Total Sales (direct and indirect):** $9,137,500 per year

### 2.f. PROFITS
- **Profits on Total Sales (direct and indirect):** 10.0% of sales, $913,750 per year
- **Risk Premium for Construction:** 2.0% of construction, $75,000 per year
- **Total Profit from Construction & Related Activity:** $988,750 per year

### 2.g. EMPLOYMENT (on-site & off-site)
- **Kauai:**
  - **Construction Jobs:** 12 jobs
  - **Indirect Employment Generated by Construction:** 16 jobs
  - **Total Kauai Employment:** 28 jobs
- **Oahu, Indirect Employment Generated by Construction:** 8 jobs
- **Total Employment:** 36 jobs

### 2.h. PAYROLL
- **Kauai:**
  - **Construction Payroll:** $53,510 average per job
  - **Payroll for Indirect Employment:** $42,928
  - **Total Kauai Payroll:** $1,328,968 per year
- **Oahu, Payroll for Indirect Employment:** $48,540 average per job
- **Total Payroll:** $1,717,360 per year

---

**Table III-2. Economic Impacts of Development Activities**

**Source or Multiplier**
- PEP
- HDF
- PEP/I-O Model
- Section 2.b
- Section 2.c
- Section 2.d above
- Section 2.e above
- PEP/I-O Model
- PEPI-O Model
- 3.31 x sales/$1 mil
- 1.99 x direct jobs
- 1.99 x direct jobs
- 35%
- 64 per year
- 55%
- 65%
- 35%
- 68 per year

**Initial Dairy**
- $7,500,000
- $2,000,000
- $2,851,875
- $1,535,625
- $4,387,500
- $3,750,000
- $1,000,000
- $2,000,000
- $1,500,000
- $1,000,000
- $1,000,000
- $944,548
- $4,387,500
- $944,548
- $3,442,952
- $5,694,548
- $4,387,500
- $4,387,500
- $5,694,548
- $3,442,952
- $9,137,500
- $1,328,968
- $48,540
- $1,717,360

**Potential Increase**
- $±1,500,000
- $±500,000
- $±500,000
- $±500,000

**Units**
- per year
- per year
- per year
- per year
- per year
- per year
- per year
- per year
- per year
- per year
- per year
- per year
- per year
- per year
- per year
- per year
- per year

**(Values in 2015 dollars)**

---
<table>
<thead>
<tr>
<th>Item</th>
<th>Source or Multiplier</th>
<th>Initial Dairy</th>
<th>Potential Increase</th>
<th>Potential Dairy</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.i. POPULATION SUPPORTED BY DEVELOPMENT ACTIVITIES</td>
<td>PEP/Census</td>
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<td></td>
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<tr>
<td>Kauai Residents</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Supported by Construction Jobs</td>
<td>2.28 per job</td>
<td>27</td>
<td>-</td>
<td></td>
<td>residents</td>
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<tr>
<td>Supported by Indirect Jobs</td>
<td>2.28 &quot;</td>
<td>36</td>
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<td>&quot;</td>
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<tr>
<td>Total Kauai Residents</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oahu Residents Supported by Indirect Jobs</td>
<td>2.04 per job</td>
<td>16</td>
<td>-</td>
<td>&quot;</td>
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<tr>
<td>Total Residents Supported</td>
<td></td>
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</tr>
<tr>
<td>2.j. HOUSING FOR SUPPORTED POPULATION</td>
<td>PEP/Census</td>
<td></td>
<td></td>
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<td>Kauai Homes</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Supported by Construction Jobs</td>
<td>0.33 per resident</td>
<td>9</td>
<td>-</td>
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<td>homes</td>
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<tr>
<td>Supported by Indirect Jobs</td>
<td>0.33 &quot;</td>
<td>12</td>
<td>-</td>
<td>&quot;</td>
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<td>Total Homes</td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>Oahu Homes Supported by Indirect Jobs</td>
<td>0.32 per resident</td>
<td>5</td>
<td>-</td>
<td>&quot;</td>
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<td>Total Homes Supported</td>
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Table III-2. Economic Impacts of Development Activities
(Values in 2015 dollars)
(continued)
### Table III-3. Economic Impacts at Full Operations

(Values in 2015 dollars)

<table>
<thead>
<tr>
<th>Item</th>
<th>Source or Multiplier</th>
<th>Initial Dairy</th>
<th>Potential Increase</th>
<th>Potential Dairy</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.a. MILKING COWS</td>
<td>HDF</td>
<td>699</td>
<td>1,301</td>
<td>2,000</td>
<td>cows</td>
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<td>3.b. PRODUCTION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td>PEP/HDF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Livestock (calves, and culled cows and heifers)</td>
<td>6.0 gallons per day</td>
<td>1,530,810</td>
<td>2,849,190</td>
<td>4,380,000</td>
<td>gallons/yr</td>
</tr>
<tr>
<td>3.c. SALES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kauai Dairy</td>
<td>PEP/HDF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indirect Sales</td>
<td>PEP-I-O Model</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Kauai Sales</td>
<td>$ 8,132,887</td>
<td>$ 15,137,177</td>
<td>$ 23,270,064</td>
<td>per year</td>
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</tr>
<tr>
<td>Oahu Indirect Sales</td>
<td>PEP-I-O Model</td>
<td>$ 1,988,628</td>
<td>$ 3,701,668</td>
<td>$ 5,690,496</td>
<td>per year</td>
</tr>
<tr>
<td>Total Sales</td>
<td>$ 10,121,715</td>
<td>$ 18,838,845</td>
<td>$ 28,960,560</td>
<td>per year</td>
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</tr>
<tr>
<td>Final Consumption Sales (taxed at 4%)</td>
<td>PEP</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Intermediate Sales (taxed at 0.5%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.d. PROFITS (on direct and indirect sales)</td>
<td>10% of sales</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kauai Dairy</td>
<td>HDF</td>
<td>5</td>
<td>5</td>
<td>10</td>
<td>jobs</td>
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<tr>
<td>Indirect Jobs</td>
<td>PEP-I-O Model</td>
<td>6</td>
<td>6</td>
<td>12</td>
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</tr>
<tr>
<td>Total Kauai Employment</td>
<td>11</td>
<td>11</td>
<td>22</td>
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<td></td>
</tr>
<tr>
<td>Oahu Indirect Employment</td>
<td>PEP/DBEDT I-O Model</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>jobs</td>
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<td>Total Employment</td>
<td>14</td>
<td>14</td>
<td>28</td>
<td></td>
<td></td>
</tr>
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<td>3.f. PAYROLL</td>
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<td></td>
</tr>
<tr>
<td>Kauai Payroll</td>
<td>PEP/HDF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indirect Jobs</td>
<td>PEP/DLIR</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Oahu Payroll</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Total Payroll</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Dairy Payroll in Excess of Average Wages</td>
<td>PEP/DLIR</td>
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<tr>
<td>In Excess of the County Average Wage</td>
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<td></td>
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</tr>
<tr>
<td>In Excess of the State Average Wage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.g. POPULATION SUPPORTED BY OPERATIONS</td>
<td>PEP/Census</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Kauai Residents</td>
<td>Supported by Dairy Jobs</td>
<td>2.28 per job</td>
<td>11</td>
<td>11</td>
<td>22</td>
</tr>
<tr>
<td>Supported by Indirect Jobs</td>
<td>2.28</td>
<td>14</td>
<td>14</td>
<td>28</td>
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<td>Total Kauai Residents</td>
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<td>25</td>
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<td>Oahu Residents Supported by Indirect Jobs</td>
<td>2.04 per job</td>
<td>6</td>
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<tr>
<td>Total Residents Supported</td>
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<td>62</td>
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<td>3.h. HOUSING FOR SUPPORTED POPULATION</td>
<td>PEP/Census</td>
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<tr>
<td>Kauai Homes</td>
<td>Supported by Dairy Jobs</td>
<td>0.33 per resident</td>
<td>4</td>
<td>4</td>
<td>8</td>
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<tr>
<td>Supported by Indirect Jobs</td>
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<tr>
<td>Total Homes</td>
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<td>9</td>
<td>18</td>
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</tr>
<tr>
<td>Oahu Homes Supported by Indirect Jobs</td>
<td>0.32 per resident</td>
<td>2</td>
<td>2</td>
<td>4</td>
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<tr>
<td>Total Homes Supported</td>
<td>11</td>
<td>11</td>
<td>22</td>
<td>homes</td>
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</table>
### Table III-4. Impacts on County Revenues and Expenditures
(Values in 2015 dollars)

<table>
<thead>
<tr>
<th>Item</th>
<th>Source or Multiplier</th>
<th>Initial Dairy</th>
<th>Potential Increase</th>
<th>Potential Dairy</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4.a. CHANGE IN TAX &amp; EXPENDITURE BASE</strong></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Development Activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessed Land, Dairy (dedicated to agriculture)</td>
<td>$ 210 per acre</td>
<td>$ 116,970</td>
<td>-</td>
<td>$ 116,970</td>
<td></td>
</tr>
<tr>
<td>Less Existing Land Value</td>
<td>$ (116,970)</td>
<td>-</td>
<td>$ (116,970)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building Improvements, Dairy</td>
<td>Section 2.b</td>
<td>$ 7,500,000</td>
<td>-</td>
<td>$ 7,500,000</td>
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<tr>
<td><strong>Total Change in Assessed Value</strong></td>
<td></td>
<td>$ 7,500,000</td>
<td>-</td>
<td>$ 7,500,000</td>
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<td><strong>4.b. DEVELOPMENT ACTIVITIES</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional County Revenues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional Expenditures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infrastructure (provided by developer)</td>
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<tr>
<td>Services</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Net Revenues</strong></td>
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<td></td>
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<tr>
<td><strong>4.c. OPERATIONS</strong></td>
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<tr>
<td>Additional County Revenues</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Property Taxes on Dairy</td>
<td>$ 6.75 per $1,000</td>
<td>$ 50,625</td>
<td>-</td>
<td>$ 50,625</td>
<td>per year</td>
</tr>
<tr>
<td>Supported Residents and Businesses</td>
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<td></td>
<td>see text</td>
<td></td>
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</tr>
<tr>
<td>Additional Expenditures</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Debt Services</td>
<td>PEP/HDF</td>
<td></td>
<td>$ -</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Services</td>
<td></td>
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<td>Dairy</td>
<td>PEP/HDF</td>
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<td>Supported Residents and Businesses</td>
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<td><strong>Net Revenues</strong></td>
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<td>$ 50,625</td>
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## Table III-5. Impacts on State Revenues and Expenditures
(Values in 2015 dollars)

<table>
<thead>
<tr>
<th>Item</th>
<th>Source or Multiplier</th>
<th>Initial Dairy</th>
<th>Potential Increase</th>
<th>Potential Dairy</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>5.a. CHANGE IN TAX &amp; EXPENDITURE BASE</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Development Activities</strong></td>
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</tr>
<tr>
<td>Duration</td>
<td>Table III-2, Section 2.a</td>
<td>2</td>
<td>1</td>
<td></td>
<td>years</td>
</tr>
<tr>
<td>Final Sales (taxed at 4%)</td>
<td></td>
<td></td>
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<tr>
<td>Annual Average</td>
<td>Table III-2, Section 2.e</td>
<td>$5,694,548</td>
<td>$ -</td>
<td></td>
<td>per year</td>
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<tr>
<td>Cumulative</td>
<td></td>
<td>$11,389,096</td>
<td>$ -</td>
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<td>$11,389,096</td>
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<tr>
<td>Intermediate Sales (taxed at 0.5%)</td>
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<td></td>
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<tr>
<td>Annual Average</td>
<td>Table III-2, Section 2.e</td>
<td>$3,442,952</td>
<td>$ -</td>
<td></td>
<td>per year</td>
</tr>
<tr>
<td>Cumulative</td>
<td></td>
<td>$6,885,904</td>
<td>$ -</td>
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<td>$6,885,904</td>
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<tr>
<td>Profits (on direct and indirect sales)</td>
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</tr>
<tr>
<td>Annual Average</td>
<td>Table III-2, Section 2.f</td>
<td>$988,750</td>
<td>$ -</td>
<td></td>
<td>per year</td>
</tr>
<tr>
<td>Cumulative</td>
<td></td>
<td>$1,977,500</td>
<td>$ -</td>
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<td>$1,977,500</td>
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<tr>
<td>Payroll</td>
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<tr>
<td>Annual Average</td>
<td>Table III-2, Section 2.g</td>
<td>$1,717,360</td>
<td>$ -</td>
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<td>per year</td>
</tr>
<tr>
<td>Cumulative</td>
<td></td>
<td>$3,434,720</td>
<td>$ -</td>
<td></td>
<td>$3,434,720</td>
</tr>
<tr>
<td><strong>Operations</strong></td>
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</tr>
<tr>
<td>Sales</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Consumption Expenditures (taxed at 4%)</td>
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<td>not shown to avoid disclosure</td>
<td></td>
<td></td>
<td>per year</td>
</tr>
<tr>
<td>Indirect Sales (taxed at 0.5%)</td>
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</tr>
<tr>
<td>Total</td>
<td>Table III-3, Section 3.c</td>
<td>$10,121,715</td>
<td>$18,838,845</td>
<td></td>
<td>$28,960,560</td>
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<td>Profits (on direct and indirect sales)</td>
<td>Table III-3, Section 3.f</td>
<td>$1,012,172</td>
<td>$1,883,885</td>
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<td>$2,896,056</td>
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<td>Payroll in Excess of Average</td>
<td>Table III-3, Section 3.f</td>
<td>not shown to avoid disclosure</td>
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<tr>
<td><strong>5.b. DEVELOPMENT ACTIVITIES</strong></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Additional State Revenues, Cumulative</td>
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<tr>
<td>Excise Tax</td>
<td>State</td>
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<tr>
<td>Final Sales</td>
<td>4.0% of sales</td>
<td>$455,564</td>
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<td>$455,564</td>
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<tr>
<td>Intermediate Sales</td>
<td>0.5%</td>
<td>&quot;</td>
<td>$34,430</td>
<td>$ -</td>
<td>$34,430</td>
</tr>
<tr>
<td>Total Excise Tax</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Corporate Income Taxes</td>
<td>PEP/State</td>
<td>$19,775</td>
<td>$ -</td>
<td></td>
<td>$19,775</td>
</tr>
<tr>
<td>Personal Income Taxes</td>
<td>PEP/State</td>
<td>4.1% of income</td>
<td>$140,824</td>
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<td>Total State Tax Revenues</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>State</td>
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<td>$650,593</td>
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<tr>
<td>Additional Expenditures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tax Credits, Important Ag Lands</td>
<td>HDF</td>
<td>$1,000,000</td>
<td>$ -</td>
<td></td>
<td>$1,000,000</td>
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<tr>
<td>Infrastructure (provided by developer)</td>
<td>PEP/HDF</td>
<td>$ -</td>
<td>$ -</td>
<td></td>
<td>$ -</td>
</tr>
<tr>
<td>Services</td>
<td>PEP/HDF</td>
<td>$ -</td>
<td>$ -</td>
<td></td>
<td>$ -</td>
</tr>
<tr>
<td><strong>Net Revenues, Cumulative</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td>(349,407)</td>
<td>$ -</td>
<td>(349,407)</td>
</tr>
</tbody>
</table>

Table III-5, Section 3.f not shown to avoid disclosure.
Table III-5. Impacts on State Revenues and Expenditures  
(Values in 2015 dollars)  
(continued)

<table>
<thead>
<tr>
<th>Item</th>
<th>Source or Multiplier</th>
<th>Initial Dairy</th>
<th>Potential Increase</th>
<th>Potential Dairy</th>
<th>Units</th>
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<tbody>
<tr>
<td>5.c. OPERATIONS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional State Revenues, Annual</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Excise Tax Generated by:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption Expenditures</td>
<td></td>
<td></td>
<td>not estimated to avoid disclosure</td>
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<td>per year</td>
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<td>0.5% of sales</td>
<td>$50,609</td>
<td>$94,194</td>
<td>$144,803</td>
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<tr>
<td>Corporate Income Tax</td>
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<td>$10,122</td>
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<td>$28,961</td>
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<td>Personal Inc Tax on Payroll in Excess of Average</td>
<td>PEP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Revenues</td>
<td></td>
<td></td>
<td>$60,731</td>
<td>$113,033</td>
<td>$173,764</td>
</tr>
<tr>
<td>Additional Expenditures, Annual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt Services</td>
<td>PEP/HDF</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dairy</td>
<td>PEP/HDF</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td></td>
</tr>
<tr>
<td>Supported Residents and Businesses</td>
<td></td>
<td></td>
<td>see text</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Revenues, Annual</td>
<td></td>
<td></td>
<td>$60,731</td>
<td>$113,033</td>
<td>$173,764</td>
</tr>
</tbody>
</table>
APPENDIX K

HYDROLOGIC ASSESSMENT FOR THE PASTURE AREAS FOR HAWAIʻI DAIRY FARMS, MĀHĀʻULEPŪ, KAUAʻI, HAWAIʻI

GROUP 70 INTERNATIONAL
HYDROLOGIC ASSESSMENT
FOR THE PASTURE AREAS

For

HAWAI‘I DAIRY FARMS

MĀHĀ ‘ULEPŪ, KAUA‘I, HAWAI‘I

TMK: (4) 2-9-003: 001 por and 006 por
(4) 2-9-001: 001 por

Prepared for:
Hawai‘i Dairy Farms, LLC
P.O. Box 1690
Kōloa, Hawai‘i 96756-1690

Prepared by:
925 Bethel Street, 5th Floor
Honolulu, Hawai‘i 96813
(808) 523-5866

May 9, 2016
TABLE OF CONTENTS

TABLE OF CONTENTS ........................................................................................................................................... i
LIST OF FIGURES & TABLES ........................................................................................................................... ii
APPENDICES ................................................................................................................................................ ii

1 INTRODUCTION ........................................................................................................................................... 1
   1.1 Proposed Project ......................................................................................................................................... 1
   1.2 Project Location and Land Use ................................................................................................................... 2

2 DESIGN CRITERIA ........................................................................................................................................ 4

3 EXISTING CONDITIONS .................................................................................................................................. 11
   3.1 Topography and Drainage Runoff Patterns ................................................................................................. 11
   3.2 Existing Water Resources .......................................................................................................................... 12
   3.3 Soils Condition ........................................................................................................................................... 12
   3.4 Rainfall Data ............................................................................................................................................... 14
   3.5 Existing Hydrology .................................................................................................................................. 14

4 PROPOSED CONDITIONS ................................................................................................................................ 17
   4.1 Grading and Topography .......................................................................................................................... 18
   4.2 Soils Conditions ......................................................................................................................................... 18
   4.3 Stormwater Management ........................................................................................................................... 18
   4.4 Proposed Hydrology (Farm) ....................................................................................................................... 20
   4.5 Proposed Drainage Infrastructure ............................................................................................................ 24

5 REFERENCES .................................................................................................................................................. 25
   5.1 County of Kauai ......................................................................................................................................... 25
   5.2 State of Hawai‘i ......................................................................................................................................... 25
   5.3 U.S. Department of Agriculture ............................................................................................................... 25
LIST OF FIGURES & TABLES

Figure 1 – Vicinity Map
Figure 2 – Location Map
Figure 3 – USGS Map
Figure 4 – Water Resources Map
Figure 5 – Soils Map
Figure 6 – Paddock Map
Figure 7 – Farm Map
Figure 8 – Hydrology Exhibit – Existing Conditions
Figure 9 – Hydrology Exhibit – Proposed Conditions

Table 1 – Soil Characteristics Summary
Table 2 – NOAA 24-Hour Rainfall Data
Table 3 – Existing Hydrology
Table 4 – NRCS Practice Codes and Infrastructure Improvements
Table 5 – Proposed Hydrology
Table 6 – Comparison in Peak Flows (Existing to Proposed)

APPENDICES

Appendix A – Win TR-55 Printouts
1 INTRODUCTION

This assessment presents an overall hydrologic analysis for the existing and proposed conditions for the Hawai‘i Dairy Farms project, as well as the storm drainage design criteria which will be utilized for the design of facility and farm specific drainage infrastructure as part of the project’s Conservation Plan and farm construction plans.

1.1 Proposed Project

In late 2013, Ulupono Initiative made the investment to fund Hawai‘i Dairy Farms, the first pasture-based rotational-grazing dairy in the state. Hawai‘i Dairy Farms, LLC (HDF) was formed as a positive step toward the island state’s food security, economic diversity, and sustainability. At steady-state production with 699 milking cows, the farm will produce roughly 1.2 million gallons annually. HDF will reduce Hawai‘i’s reliance on imported milk from the mainland United States by increasing current fresh local milk production by approximately 33 percent. The farm will be based on the most successful island dairy models in the world, and will utilize a sustainable, pasture-based rotational-grazing system and 21st century technology. The farm will be very different from conventional feedlot dairy operations.

HDF is committed to establishing a herd of up to 699 mature dairy cows, and demonstrating the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State of Hawai‘i, Department of Health (DOH) is required. The application process for a National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) permit includes public notification and input. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land,
which is currently estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The project will be located in the Māhāʻulepū Valley on the island of Kauaʻi, exclusively within the approximate 556.8 acres of land leased by HDF from Mahaulepu Farm LLC. See Figure 1 – Vicinity Map.

Regardless of the amount of animals on the farm, the majority of infrastructure must be constructed prior to commencement of any dairy operations. The farm improvements discussed herein will be used to support the dairy, whether for the initial herd of 699 mature dairy cows, to up to 2,000 mature dairy cows.

1.2 Project Location and Land Use
The project site is situated in the Māhāʻulepū Valley on the island of Kauaʻi. The valley is on the leeward side of the Hāʻupu mountain ridge, which runs in the east-west direction, and the valley is also flanked by ridge lines on both sides. The project area has historically been used for sugar cane production as part of the Kōloa Plantation until the late 1990s when the Kōloa Mill closed. Since the mill closed, the project area has been leased to various tenants for ranching and diversified agricultural operations. A small plot of land in the lower center of the valley is currently used for taro loʻi and will continue to be leased and farmed after the dairy and related pastures are in full operation. See Figure 2 – Location Map

The original agricultural infrastructure from the sugar plantation is largely still in place and continues to be used for on-going agricultural activities. Much of this existing infrastructure will also be used for the dairy, but with a significant amount of upgrades and improvements. The existing infrastructure in the project area includes: gravel and dirt access roads, field roads, water wells, reservoirs, pipelines, pumps, irrigation ditches, drainage ways and culverts.

The project area is comprised of lands designated pursuant to the Hawaiʻi State Constitution as Important Agricultural Lands. Accordingly, the project is consistent not only with past agricultural use of the area, but with ongoing constitutionally recognized interest in maintaining and utilizing the area for agricultural purposes that promote agricultural self-sufficiency.
Unlike conventional feed lot dairies, in which mature dairy cows are confined and fed only hay and silages, the project will be the first dairy in the State to utilize rotational, pasture-based grazing. The rotational, pasture-based grazing approach is a system that involves regularly rotating cows through farm paddocks, where they will primarily feed on locally grown grass, supplemented with grain and vitamins as needed. This approach optimizes grass growth, cow health and milk production, facilitates even applications of waste products for fertilization, prevents over-grazing and over-application of fertilizers, and maintains erosion and runoff controls.

The initial herd of up to 699 mature dairy cows will be divided into groups and rotated through a series of paddocks over an 18-day period to access fresh grass and deposit manure throughout the area. Cows will move through a system of raceways to and from the milking parlor, where they will be milked twice a day for a total of two hours. The remaining dry cows, heifers and 90-day and older calves will be managed off-property on existing ranches that are owned and operated by other local ranchers. The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that livestock and grazing activities are contained within the project area.
2 DESIGN CRITERIA

The project will utilize various design criteria due to the available design standards for agricultural operations within the United States, the State of Hawai‘i, and the County of Kauai. Drainage design criteria and considerations will be used from the following sources:

2.1 References:

4. All subsequent revisions and amendments for the above referenced standards.

2.2 Design Recurrence Interval (Tm):

Different recurrence intervals will be utilized for analyzing project site and tributary storm drainage flows, and for sizing of the drainage infrastructure on the farm, depending on the type of infrastructure improvements that are constructed and by the governing code and references listed above.

The drainage facility itself is located within 9.7 acres within the farm. Local drainage improvements such as catch basins, storm drain piping, downspouts, and other conveyance systems will be designed to meet the 2-year, 1-hour storm event per County requirements.

Farm-wide improvements will be designed to applicable NRCS Standards and Specifications. If improvements are not covered under applicable NRCS Standards and Specifications, improvements affecting drainage areas less than 100 acres in size will be designed to the 2-year, 1-hour event, and areas greater than 100 acres will be designed to the 100-year, 1-hour event.
Drainage improvements and best management practices will be installed at the guidance, direction, and approval of the NRCS, in accordance with standard practice for agricultural operations, as applicable. These improvements and best management practices will be shown on Hawai’i Dairy Farm’s Conservation Plan.

Such improvements are typically required to address stormwater management on farm and agricultural lands, and the County typically defers approval of the stormwater and runoff management improvements and best management practices to the local soils and water conservation district, so long as the improvements are constructed to NRCS standards and specifications. The following NRCS practice codes will be used for the site, and the appropriate design recurrence interval is noted.

*Standards and Specifications, Field Office Technical Guide (FOTG), Pacific Islands*

- **For stream/ditch crossings for animals/persons/equipment:**
  \[ T_m = 2\text{-year}, 24\text{-hour peak discharge} \]
  (Per NRCS Conservation Practice Standard Code 578)

- **For stream/ditch crossings for access roads:**
  \[ T_m = 10\text{-year}, 24\text{-hour peak discharge for frequent use for a farm headquarters} \]
  (Per NRCS Conservation Practice Standard Code 578)

- **For vegetated/grassed waterways:**
  \[ T_m = 10\text{-year}, 24\text{-hour peak discharge} \]
  (Per NRCS Conservation Practice Standard Code 412)

### 2.3 Runoff Quantity (Q\_peak):

Similarly, different methods of calculating peak flows will be utilized for analyzing the project site’s generated runoff as well as tributary storm drainage flows for sizing of the drainage infrastructure on the farm, depending on the type of improvements required and by the governing standard.
The drainage facility itself is located within 9.7 acres within the farm. Local drainage flows will be analyzed using the Rational Method, per the County of Kauai standard.

Farm-wide infrastructure improvements, affecting tributary areas greater than 100 acres, will be analyzed using TR-55 or TR-20 programs.

*Storm Water Runoff System Manual, Department of Public Works, County of Kauai*

- For drainage areas less than 100 acres
  
  Rational Method, \( Q = CIA \)

  Where \( Q = \) flow (cfs), \( C = \) Runoff Coefficient, \( I = \) Intensity (in/hr), and \( A = \) Area (acres)

- For drainage areas greater than 100 acres and less than 2,000 acres
  
  Utilize TR-55 or TR-20 Program

The NRCS Standards and Specifications defer to County requirements to determine peak flows.

*Standards and Specifications, Field Office Technical Guide (FOTG), Pacific Islands*

- Stormwater Runoff Control, per NRCS Conservation Practice Standard Code 570.
  
  Prepare a plan, design, and construct controls to comply with applicable federal, state, and local laws and regulations.
2.4 Runoff Coefficient (C) – For Use with the Rational Method:

*Storm Water Runoff System Manual, Department of Public Works, County of Kauai*

### Table 1

**TYPICAL RUNOFF COEFFICIENTS FOR BUILT-UP AREAS**

<table>
<thead>
<tr>
<th>LAND USE OR SURFACE CHARACTERISTICS</th>
<th>AVERAGE Percent Impervious</th>
<th>STORM FREQUENCY C*</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Commercial</td>
<td>90</td>
<td>0.82</td>
</tr>
<tr>
<td>Neighborhood Commercial</td>
<td>70</td>
<td>0.60</td>
</tr>
<tr>
<td>R-1</td>
<td>10</td>
<td>0.20</td>
</tr>
<tr>
<td>R-2</td>
<td>20</td>
<td>0.38</td>
</tr>
<tr>
<td>R-4</td>
<td>50</td>
<td>0.43</td>
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<td>R-6</td>
<td>50</td>
<td>0.45</td>
</tr>
<tr>
<td>R-10</td>
<td>50</td>
<td>0.50</td>
</tr>
<tr>
<td>R-20</td>
<td>50</td>
<td>0.55</td>
</tr>
<tr>
<td>5 Acre Lot</td>
<td>8</td>
<td>0.15</td>
</tr>
<tr>
<td>Limited Industrial</td>
<td>80</td>
<td>0.71</td>
</tr>
<tr>
<td>General Industrial</td>
<td>90</td>
<td>0.80</td>
</tr>
<tr>
<td>Parks, Campgrounds</td>
<td>7</td>
<td>0.10</td>
</tr>
<tr>
<td>Playgrounds</td>
<td>13</td>
<td>0.15</td>
</tr>
<tr>
<td>Schools</td>
<td>50</td>
<td>0.45</td>
</tr>
<tr>
<td>Streets</td>
<td>100</td>
<td>0.87</td>
</tr>
<tr>
<td>Unpaved</td>
<td>95</td>
<td>0.80</td>
</tr>
<tr>
<td>Driveways and Walks</td>
<td>96</td>
<td>0.87</td>
</tr>
<tr>
<td>Roofs</td>
<td>90</td>
<td>0.80</td>
</tr>
<tr>
<td>Lawns, Sandy Soil</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Lawns, Clayey Soil</td>
<td>0</td>
<td>0.05</td>
</tr>
</tbody>
</table>

NOTE: (These Rational formula coefficients may not be valid for large basins. These coefficients are also average values and may require adjustments depending on the surface characteristics, soil type, slope, infiltration, evaporation, depression storage, etc. The Engineer shall use sound engineering judgment in selecting the proper coefficient(s).) For composite drainage areas compute "weighted" Rational formula coefficient(s). *Average impervious areas do not correlate directly to allowable impervious area.*

2.5 Runoff Curve Number (CN) – For use with TR-55 Program:

*TR-55, USDA, NRCS, Conservation Engineering Division*

- Land uses based on soils, plant cover, amount of impervious areas, condition, etc.:
  For drainage areas with more than one type of land use, a weighted value of the CN shall be computed.
2.6 **Time of Concentration (Tc):**

Similarly, different methods of the Time of Concentration (Tc) will be utilized for analyzing the project site’s generated runoff as well as tributary storm drainage flows, as required by the governing standard.

Local drainage flows at the facility will be analyzed using the Rational Method as flow paths will be less than 300 feet in length.

Farm-wide improvements will be analyzed using TR-55 or TR-20 programs and will use a summation of distinct, consecutive flow areas.

*Storm Water Runoff System Manual, Department of Public Works, County of Kauai*

- **For flow paths less than 300 feet:**
  - Use Plate 1

*TR-55, USDA, NRCS, Conservation Engineering Division*

- **For distinct consecutive flow areas:**
  - The summation of Tc shall be used. Beyond 100 feet, the flow is considered shallow concentrated flow.

2.7 **Rainfall Intensity (I):**

Similarly, different methods of determining the rainfall intensity will be utilized for analyzing the project site’s generated runoff as well as tributary storm drainage flows, as required by the governing standard.

Plate 2 and 3 of the County Code will be used to determine the appropriate rainfall intensity at the dairy facility, to be utilized with the Rational Method.

TR-55 or TR-20 programs, using NOAA 24-hour rainfall for select 24-hour events, will be used to determine rainfall intensity around the farm.
For 2-year, 1 hour event:
Use Plate 2 and 3 to determine intensity and correction factor

Based upon NOAA 24-Hour Rainfall for Select 24-hour Events
Type I Rainfall Distribution

2.8 NRCS Conservation Practice Standards and Best Management Practices Criteria:
Additional NRCS Conservation Practice Standards, used for specific infrastructure improvements to manage stormwater runoff, may be installed around the farm as needed and will follow the appropriate criteria.

Surface Cross Drains:
- Spacing for access roads: Based upon soil type and roadway grade. See Figure 1 of NRCS Conservation Practice Standard Code 560
- Spacing for animal trails and walkways: As required due to field conditions or as indicated. See NRCS Conservation Practice Standard Code 575

Waterway Setbacks and Filter Strips (393) / Buffer Plantings (390):
- Minimum Flow Length per NRCS Conservation Practice Standard Code 393: 10-year life span, with a minimum 20-foot filter strip length. Length shall be increased to 30 feet to provide additional capacity to reduce dissolved contaminants in runoff.
- Minimum Width of Buffer per NRCS Conservation Practice Standard Code 390: Buffer shall be 2.5 times the stream width from bank-full elevations or 35 feet to provide capacity to maintain or improve water quality and quantity
management. Concentrated flow erosion should be controlled up-gradient of buffer.

- Design Slopes per NRCS Conservation Practice Standard Code 393: Upstream drainage area should have minimum 1% slope. The maximum gradient along the leading edge shall not exceed 5%.

- **Grassed Waterway (412) / Field Ditch (607):**
  - Minimum Capacity per NRCS Conservation Practice Standard Code 412: Waterway shall convey the peak runoff from the 10-year, 24-hour duration event. Capacity shall be increased to account for potential high volumes of sediment. When the slope is less than 1%, out of bank flow is permitted so long as erosion is minor.
  - Minimum Capacity per NRCS Conservation Practice Standard Code 607: Application of locally tried and proven drainage coefficients, plus consideration for yield of groundwater or irrigation water.
  - Maximum Side Slope per NRCS Conservation Practice Standard Code 412: Flatter than 2 to 1 H:V slopes and should accommodate equipment needed for maintenance and tillage/harvesting.
3 EXISTING CONDITIONS

Since the sugar plantation closed, the project area has been leased to various tenants for ranching and diversified agricultural operations. A small plot of land in the lower center of the valley is currently used for taro lo’i and will continue to be leased and farmed after the dairy and related pastures are in full operation. Neighboring operators consist of beef cattle and banana crops.

Currently, the site is being used for grass trials in preparation of construction and establishment of the dairy facility and pastures. Irrigation systems for growing the grass, watering facilities, limited fencing, and monitoring wells have also been installed, though the site is largely vacant. Clearing and mowing has been taking place as part of ongoing maintenance.

3.1 Topography and Drainage Runoff Patterns

The project site is situated in the Māhāʻulepū Valley on the island of Kaua‘i. The valley is on the leeward side of the Haʻupu mountain ridge, which runs in the east-west direction, and the valley is also flanked by ridge lines on both sides. Mt. Haʻupu is the highest point on the ridge line at the back of the valley with an elevation of 2,297 feet. From this point, the ground drops very quickly down to the bottom of the valley to about an elevation of 150 feet. The base of the valley itself is somewhat gradually sloped from an elevation of 150 feet to an elevation of 60 feet along Māhāʻulepū Road on the makai side of the project site near the taro farm.

Runoff from the valley walls is generally conveyed via shallow concentrated flow which collects into cutoff ditches along the exterior of the boundary of the farm. The cutoff ditches are typically located on the uphill side of the proposed fence line for the dairy farm or of the farm roads, including Māhāʻulepū Road, preventing the run on of stormwater onto the farm property. These cutoff ditches then move along the fence lines or roadways and ultimately connect to two main ditches that convey water via channel flow from the upland area, through the farm, and then mauka to the ocean. The ditches were likely configured by historical agriculture uses, based upon their linear shape and as they follow two main roads on the farm site. The two ditches remain separate on the farm: Māhāʻulepū Ditch (East) which runs centrally through the farm, and Māhāʻulepū Ditch (West) which runs near the proposed facility.
location. Downstream of the farm site, the two separate ditches combine into Māhāʻulepū Ditch, before reaching the ocean.

Runoff from the farm area within the project boundaries itself generally sheet flows or flows in shallow concentration towards and into these ditches.

**See Figure 3 – USGS Map**

### 3.2 Existing Water Resources

The Māhāʻulepū Valley has been in agricultural use for a very long time and much of the water resources and infrastructure in the valley are man-made and were constructed to provide irrigation water to the sugar cane lands throughout the valley. Systems of ditches, reservoirs and irrigation pipes and pumps are still in place and are still used to irrigate fields and pasture. Some of these systems cutoff overland flow towards the project site, as they surround the farm. Much of this infrastructure is shown on the USGS maps. **See Figures 4 – Water Resources**

### 3.3 Soils Condition

According to the United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) survey data, the project area consists of a variety of soils. Soil characteristics are summarized in the table below. **See Figure 5 – Soil Map**
Table 1 – Soil Characteristics Summary

<table>
<thead>
<tr>
<th>Soil Classification</th>
<th>Soil Classification</th>
<th>Slope Range (%)</th>
<th>Hydrologic Soils Group</th>
<th>Drainage Class</th>
<th>Depth to Water Table (inches)</th>
<th>Capacity to transmit water – Ksat (in/hr)</th>
<th>Typical Soil Profile - Layer 1 (depth from surface)</th>
<th>Typical Soil Profile - Layer 2 (depth from surface)</th>
<th>Typical Soil Profile - Layer 3 (depth from surface)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hanamaulu Silty Clay</td>
<td>HsD</td>
<td>15 to 20%</td>
<td>B</td>
<td>Well Drained</td>
<td>&gt; 80”</td>
<td>0.14 to 1.98</td>
<td>0 to 11” Silty Clay</td>
<td>11 to 36” Silty Clay</td>
<td>36 to 72” Silty Clay Loam</td>
</tr>
<tr>
<td>Hanamaulu Stony Silty Clay</td>
<td>HtE</td>
<td>10 to 35%</td>
<td>B</td>
<td>Well Drained</td>
<td>&gt; 80”</td>
<td>0.20 to 2.00</td>
<td>0 to 11” Stony Silty Clay</td>
<td>11 to 36” Silty Clay</td>
<td>36 to 72” Silty Clay Loam</td>
</tr>
<tr>
<td>Ka'ena Clay, Brown Variant</td>
<td>KavB</td>
<td>1 to 6%</td>
<td>D</td>
<td>Poorly Drained</td>
<td>24 to 60”</td>
<td>0.00 to 0.20</td>
<td>0 to 10” Clay</td>
<td>10 to 37” Stony Clay</td>
<td>37 to 54” Stony Clay</td>
</tr>
<tr>
<td>Ka'ena Clay, Brown Variant</td>
<td>KavC</td>
<td>6 to 12%</td>
<td>D</td>
<td>Poorly Drained</td>
<td>24 to 60”</td>
<td>0.00 to 0.20</td>
<td>0 to 10” Clay</td>
<td>10 to 37” Stony Clay</td>
<td>37 to 54” Stony Clay</td>
</tr>
<tr>
<td>Kalapa Silty Clay</td>
<td>KdF</td>
<td>40 to 70%</td>
<td>B</td>
<td>Well Drained</td>
<td>&gt; 80”</td>
<td>0.00 to 0.20</td>
<td>0 to 10” Silty Clay</td>
<td>10 to 60” Clay</td>
<td></td>
</tr>
<tr>
<td>Kalihi Clay</td>
<td>Ke</td>
<td>n/a</td>
<td>D</td>
<td>Poorly Drained</td>
<td>24 to 60”</td>
<td>0.06 to 0.60</td>
<td>0 to 16” Clay</td>
<td>16 to 70” Clay</td>
<td></td>
</tr>
<tr>
<td>Kalapa Very Rocky Silty Clay</td>
<td>KEHF</td>
<td>40 to 70%</td>
<td>B</td>
<td>Well Drained</td>
<td>&gt; 80”</td>
<td>0.00 to 0.20</td>
<td>0 to 10” Silty Clay</td>
<td>10 to 60” Clay</td>
<td></td>
</tr>
<tr>
<td>Kalapa Very Rocky Silty Clay</td>
<td>KEHF</td>
<td>40 to 70%</td>
<td>D</td>
<td></td>
<td></td>
<td>0.00 to 0.06</td>
<td>0 to 60” Bedrock</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lualualei Clay</td>
<td>LuB</td>
<td>2 to 6%</td>
<td>D</td>
<td>Well Drained</td>
<td>&gt; 80”</td>
<td>0.00 to 0.20</td>
<td>0 to 10” Clay</td>
<td>10 to 60” Clay</td>
<td></td>
</tr>
<tr>
<td>Pakala Clay Loam</td>
<td>PdA</td>
<td>0 to 2%</td>
<td>B</td>
<td>Well Drained</td>
<td>&gt; 80”</td>
<td>0.60 to 1.98</td>
<td>0 to 16” Clay</td>
<td>16 to 60” Silty Clay Loam</td>
<td></td>
</tr>
<tr>
<td>Pakala Clay Loam</td>
<td>PdC</td>
<td>2 to 10%</td>
<td>B</td>
<td>Well Drained</td>
<td>&gt; 80”</td>
<td>0.60 to 1.98</td>
<td>0 to 16” Clay</td>
<td>16 to 60” Silty Clay Loam</td>
<td></td>
</tr>
<tr>
<td>Rock Land</td>
<td>rRK</td>
<td>n/a</td>
<td>D</td>
<td>Well Drained</td>
<td>&gt; 80”</td>
<td>0.00 to 0.06</td>
<td>0 to 4” Silty Clay</td>
<td>4 to 8” Silty Clay</td>
<td>8 to 20” Bedrock</td>
</tr>
<tr>
<td>Rock Land (Rock Outcrop)</td>
<td>rRK</td>
<td>n/a</td>
<td>D</td>
<td></td>
<td></td>
<td>0.00 to 0.06</td>
<td>0 to 60” Bedrock</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waikomo Stony Silty Clay</td>
<td>Ws</td>
<td>n/a</td>
<td>D</td>
<td>Well Drained</td>
<td>&gt; 80”</td>
<td>0.00 to 0.06</td>
<td>0 to 14” Stony Silty Clay</td>
<td>14 to 20” Stony Silty Clay Loam</td>
<td>20 to 30” Bedrock</td>
</tr>
</tbody>
</table>
3.4 Rainfall Data

Precipitation depths for various durations and recurrence intervals were obtained from NOAA Atlas 14, Volume 4, Version 3.

<table>
<thead>
<tr>
<th>Storm Event (Recurrence Interval)</th>
<th>Storm Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-year</td>
<td>1.18&quot; 3.47&quot;</td>
</tr>
<tr>
<td>2-year</td>
<td>1.55&quot; 4.78&quot;</td>
</tr>
<tr>
<td>10-year</td>
<td>2.54&quot; 8.18&quot;</td>
</tr>
<tr>
<td>25-year</td>
<td>3.17&quot; 10.4&quot;</td>
</tr>
<tr>
<td>50-year</td>
<td>3.70&quot; 12.2&quot;</td>
</tr>
<tr>
<td>100-year</td>
<td>4.25&quot; 14.1&quot;</td>
</tr>
</tbody>
</table>

3.5 Existing Hydrology

As previously noted, the site is currently utilized for diversified agriculture, though some of the site is used for grass trials for the proposed dairy. Therefore, the site is assumed to generally consist of grass, in “fair” condition, on a gentle to moderate sloping surface.

Because the entire farm site drains into two major ditches running mauka to makai, the runoff generated over the farm area is split into two drainage areas and drainage systems. Additionally, run-on onto the site and into the farm area must be considered from the upland areas and from the ridges which form Māhāʻulepū Valley, though the majority of run-on is diverted by cutoff ditches on the uphill side of the farm boundary.

Generally, runoff from the west side of the valley sheet flows or is conveyed via shallow concentrated flow through the various system of ridges and valleys along the west side of Māhāʻulepū Valley. Runoff concentrates into several ditches, cut from agricultural operations, before ultimately collecting into one of the major ditches that runs mauka to makai along the west side of the farm, and along the proposed location of the dairy facility. This ditch conveys both water collected from the various tributary ditches, but also sheet flow from the west side of the farm, to the makai boundary of the farm along Māhāʻulepū Road, before leaving the site and ultimate discharge into the ocean.
Runoff from the east side of the valley, similarly, sheet flows or is conveyed via shallow concentrated flow through the various system of ridges and valleys along the east side of Māhāʻulepū Valley. Runoff concentrates into several ditches, cut from agricultural operations, before ultimately collecting into one of the major ditches that runs mauka to makai along the central or east side of the farm. This ditch conveys both water collected from the various tributary ditches, but also sheet flow from the central and eastern areas of the farm, to the makai boundary of the farm along Māhāʻulepū Road, before leaving the site and ultimate discharge into the ocean.

The flows from these two ditches converge beyond the boundary of Hawaiʻi Dairy Farms before discharge to the ocean.

**See Figure 8 - Hydrology Exhibit - Existing Conditions**

Utilizing TR-55 for analysis of both ditches running through the valley (Māhāʻulepū Ditch East & Māhāʻulepū Ditch West), the following parameters were input into the TR-55 program to estimate the existing peak discharge from both reaches:

**Table 3 – Existing Hydrology**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Māhāʻulepū Ditch West</th>
<th>Māhāʻulepū Ditch East</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Drainage Area (acs)</td>
<td>598.3 acs</td>
<td>1179.2 acs</td>
</tr>
<tr>
<td>Runoff Curve Number (CN)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>By Area and Condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Weighted = 72</strong></td>
<td></td>
<td><strong>Weighted = 68</strong></td>
</tr>
<tr>
<td><strong>Woodlands (Fair Condition)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Group B = 215.6 acs</td>
<td></td>
<td>Soil Group B = 673.7 acs</td>
</tr>
<tr>
<td>Soil Group D = 87.7 acs</td>
<td></td>
<td>Soil Group D = 139.9 acs</td>
</tr>
<tr>
<td><strong>Pasture (Fair Condition)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Group B = 124.1 acs</td>
<td></td>
<td>Soil Group B = 35.5 acs</td>
</tr>
<tr>
<td>Soil Group D = 170.9 acs</td>
<td></td>
<td>Soil Group D = 330.1 acs</td>
</tr>
<tr>
<td>Time of Concentration (Tc)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>By Length of Flow</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total = 0.257 hours</td>
<td></td>
<td>Total = 0.246 hours</td>
</tr>
<tr>
<td><strong>Sheet Flow (Valley - Woods)</strong></td>
<td>100 feet @ ~35%</td>
<td><strong>Sheet Flow (Valley - Woods)</strong></td>
</tr>
<tr>
<td><strong>Shallow Concentrated</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,890 feet @ ~35%</td>
<td></td>
<td>4,150 feet @ ~97%</td>
</tr>
<tr>
<td><strong>Shallow Concentrated</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>650 feet @ ~8%</td>
<td></td>
<td>575 feet @ ~2.3%</td>
</tr>
<tr>
<td><strong>Channel (Farm – Stream)</strong></td>
<td></td>
<td><strong>Channel (Farm – Stream)</strong></td>
</tr>
<tr>
<td>250 feet @ 4%</td>
<td></td>
<td>1,350 feet @ 2.6%</td>
</tr>
<tr>
<td><strong>Channel to Outlet</strong></td>
<td></td>
<td><strong>Channel to Outlet</strong></td>
</tr>
<tr>
<td>5,060 feet @ 0.8%</td>
<td></td>
<td>5,780 feet @ 0.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average Velocity (fps)</th>
<th>8.59 feet per second</th>
<th>13.50 feet per second</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Based on Tc</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rainfall Intensity (I)</th>
<th>2-year = 4.78 in</th>
<th>2-year = 4.78 in</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Refer to NOAA 24-hour Rainfall Data</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-year = 8.18 in</td>
<td>10-year = 8.18 in</td>
<td></td>
</tr>
<tr>
<td>25-year = 10.4 in</td>
<td>25-year = 10.4 in</td>
<td></td>
</tr>
<tr>
<td>50-year = 12.2 in</td>
<td>50-year = 12.2 in</td>
<td></td>
</tr>
<tr>
<td>100-year = 14.1 in</td>
<td>100-year = 14.1 in</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rainfall Distribution</th>
<th>Type I</th>
<th>Type I</th>
</tr>
</thead>
</table>

| Peak Flow (Q) @ Makai Māhāʻulepū Road Boundary | 2-year = 702.4 cfs | 2-year = 1,195.0 cfs |
| In cubic feet per second | 10-year = 1,813.1 cfs | 10-year = 3,319.5 cfs |
| 25-year = 2,586.6 cfs   | 25-year = 4,846.1 cfs |                       |
| 50-year = 3,226.2 cfs   | 50-year = 6,109.9 cfs |                       |
| 100-year = 3,907.3 cfs  | 100-year = 7,461.0 cfs |                       |

| Estimated Peak Flow (Q) @ Outlet | 2-year = 1,896.9 cfs |                       |
| When Flows Combine Beyond Farm   | 10-year = 5,131.1 cfs |                       |
| 25-year = 7,429.6 cfs            |                       |                       |
| 50-year = 9,336.0 cfs            |                       |                       |
| 100-year = 11,358.2 cfs          |                       |                       |
4 PROPOSED CONDITIONS

As previously noted, Hawai‘i Dairy Farms will be the first pasture-based rotational-grazing dairy in the state, and was formed as a positive step toward the island state’s food security, economic diversity, and sustainability. At steady-state production with 699 milking cows, the farm will produce roughly 1.2 million gallons annually. The farm will be based on the most successful island dairy models in the world, and will utilize a sustainable, pasture-based rotational-grazing system and 21st century technology. The farm will be very different from conventional feedlot dairy operations.

HDF is committed to establishing a herd of up to 699 mature dairy cows, and demonstrating the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future, to up to 2,000 mature dairy cows. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land.

The majority of infrastructure must be constructed prior to commencement of dairy operations, regardless of the amount of animals on the farm. Improvements to be constructed include a milking facility, storage shed, calf sheds, concrete walkways and pads, vehicular turnaround, an animal holding area, a wastewater settling pond and storage pond, and a berm to provide secondary containment for the ponds. Additional farm improvements include the installation of gravel and dirt animal walkways and trails, gravel and dirt access roadways, fencing, paddocks and pasture, irrigation systems, refurbishment of an existing potable water well, animal watering facilities, and an animal cemetery. Utilities, including water, sewer, storm drainage, electrical, and communications, will be installed to support the farm.

Due to the agricultural nature of the project, improvements are not expected to significantly alter existing runoff amounts and drainage patterns. NRCS Conservation Practice Standards will be used to design Best Management Practices (BMPs) to manage stormwater run-on from the adjacent valley, as well as runoff from the farm. These BMPs will be designed,
implemented, and utilized specifically for the existing and proposed site conditions of HDF and will mitigate impact from proposed uses to the extent practicable. Stormwater management on the farm will be critical to ensure minimal impact from runoff, and to prevent nutrients from cow manure, liquid effluent, slurry applications, and commercial fertilizer (used as nutrient for grass forage growth essential to the cows’ diet) from entering into the drainage system and ultimately, the ocean.

See Figure 6 – Paddock Map & Figure 7 – Farm Map

4.1 Grading and Topography
No grading activities have occurred on site thus far. After the proposed improvements to the site, topography of the farm is not expected to be significantly altered. Low lying areas, berms, and other features that have been installed by previous agricultural operations may be removed or smoothed out, per the appropriate NRCS Conservation Practice Code (466), to allow for more level land for grass growth and the cows to graze on. Smoothing will also improve stormwater flow by allowing runoff to properly drain from lower-lying areas and behind berms. Old irrigation field ditches, not including the main ditches running mauka to makai used for conveyance purposes, which were previously installed and have not been maintained, will either be restored or removed. Grading will not impact overall drainage patterns throughout the farm and will not affect the two major ditches serving the site.

4.2 Soils Conditions
According to available soils testing data from the site, the soils are severely nutrient deficient. Part of the project involves the land application of liquid effluent, as-excreted manure, slurry, and commercial fertilizers which will assist with the nutrient content of the soil needed for adequate grass growth to sustain the dietary needs of the cows. As such, it is expected that soils conditions will improve and will assist with the management of stormwater runoff quantity and quality as the grass becomes established.

4.3 Stormwater Management
Stormwater management, including provisions for both water quantity as well as water quality, for during-construction stormwater discharges from new construction projects are governed by NPDES General Permit coverage under the State of Hawai‘i Department of Health, Clean Water
Branch. As the disturbed area of the dairy facility, including the milking parlor, effluent ponds, holding yards, calf sheds, and implement shed, is greater than 1 acre, the facility construction site will be subject to NPDES General Permit coverage and requirements. For farm improvements done for the sole purpose of growing crops (HAR 11-55 Appendix C and DOH E-Permitting Portal for NPDES Permits) beyond the dairy facility, NPDES General Permit coverage is typically not required. However, after consultation with the Clean Water Branch and the County of Kauai, the proposed project will submit for NPDES General Permit coverage for Construction Activities for select farm improvements, including the construction of the farm roads, and will prepare a Storm Water Pollution Prevention Plan (SWPPP) to manage stormwater runoff during construction.

Stormwater management best management practices, including provisions for both water quantity as well as water quality, for post-construction stormwater discharges from the proposed farm infrastructure will be installed around the farm under NRCS guidance, and in conjunction with the West Kauai Soils and Water Conservation District (SWCD) - approved and NRCS-reviewed Conservation Plan for the Hawai‘i Dairy Farm project.

Infrastructure improvements which will impact runoff patterns, conveyance, and water quantity and quality around the farm will be installed per NRCS Conservation Practice Codes and Standards in accordance with the Conservation Plan for the project, and include:

<table>
<thead>
<tr>
<th>NRCS Practice Code:</th>
<th>Discipline</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Roads (560)</td>
<td>Water Quantity</td>
<td>Governs design of access roadways and installation of surface cutoff ditches or cross drains.</td>
</tr>
<tr>
<td>Animal Trails and Walkways (575)</td>
<td>Water Quantity</td>
<td>Governs design of animal walkways and installation of surface cutoff ditches or cross drains.</td>
</tr>
<tr>
<td>Filter Strip (393)</td>
<td>Water Quality</td>
<td>Governs the installation of filter strips and buffers along waterways. Recommends minimum of 30 feet setback to provide removal of dissolved pollutants. HDF intends to install 35 foot setbacks.</td>
</tr>
</tbody>
</table>
### Proposed Hydrology (Farm)

Hydrology for the post-construction conditions on the farm will be analyzed using the TR-55 program. Because the drainage patterns, pathways, and conveyance systems primarily remain the same, the only appreciable difference in the analysis of runoff generation will be the condition of the pasture and fields. This change will be input into the TR-55 program.
Due to the tillage, cultivation, maintenance, and maturation of the pastures needed to ensure that adequate grass growth and management of stormwater occurs on fields used for grazing dairy cattle, the condition of the pastures will be assumed to improve to “good” for the purposes of the TR-55 program. Kikuyu grass, which will be planted on each of the paddocks on the farm, will be carefully managed, monitored, and maintained. Grassed waterways will be used to drain paddocks, and vegetated filter strips with riparian herbaceous cover will be provided along water courses and ditches to provide water quality protection and improved bio-filtration and infiltration.

See Figure 10 – Hydrology Exhibit – Proposed Conditions

Utilizing TR-55 for analysis of both ditches running through the valley (Māhāʻulepū Ditch East & Māhāʻulepū Ditch West), the following parameters were input into the TR-55 program to estimate the proposed peak discharge from both reaches:
**Table 5 – Proposed Hydrology**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Māhā’ulepū Ditch West</th>
<th>Māhā’ulepū Ditch East</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Drainage Area (acs)</strong></td>
<td>598.3 acs</td>
<td>1179.2 acs</td>
</tr>
<tr>
<td><strong>Runoff Curve Number (CN)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>By Area and Condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weighted = 69</td>
<td></td>
<td>Weighted = 68</td>
</tr>
<tr>
<td>Woodlands (Fair Condition)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Group B = 215.6 acs</td>
<td></td>
<td>Soil Group B = 673.7 acs</td>
</tr>
<tr>
<td>Soil Group D = 87.7 acs</td>
<td></td>
<td>Soil Group D = 139.9 acs</td>
</tr>
<tr>
<td>Pasture (Good Condition)</td>
<td></td>
<td>Pasture (Good Condition)</td>
</tr>
<tr>
<td>Soil Group B = 124.1 acs</td>
<td></td>
<td>Soil Group B = 35.5 acs</td>
</tr>
<tr>
<td>Soil Group D = 170.9 acs</td>
<td></td>
<td>Soil Group D = 330.1 acs</td>
</tr>
<tr>
<td><strong>Time of Concentration (Tc)</strong></td>
<td>Total = 0.257 hours</td>
<td>Total = 0.246 hours</td>
</tr>
<tr>
<td>By Length of Flow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheet Flow (Valley - Woods)</td>
<td>100 feet @ ~35%</td>
<td>100 feet @ ~97%</td>
</tr>
<tr>
<td>Shallow Concentrated</td>
<td>1,890 feet @ ~35%</td>
<td>4,150 feet @ ~97%</td>
</tr>
<tr>
<td>Shallow Concentrated</td>
<td>650 feet @ ~8%</td>
<td>575 feet @ ~2.3%</td>
</tr>
<tr>
<td>Channel (Farm – Stream)</td>
<td>250 feet @ 4%</td>
<td>1,350 feet @ 2.6%</td>
</tr>
<tr>
<td>Channel to Outlet</td>
<td>5,060 feet @ 0.8%</td>
<td>5,780 feet @ 0.9%</td>
</tr>
<tr>
<td><strong>Average Velocity (fps)</strong></td>
<td>8.59 feet per second</td>
<td>13.50 feet per second</td>
</tr>
<tr>
<td>Based on Tc</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rainfall Intensity (I)</strong></td>
<td>2-year = 4.78 in</td>
<td>2-year = 4.78 in</td>
</tr>
<tr>
<td>Refer to NOAA 24-hour Rainfall Data</td>
<td>10-year = 8.18 in</td>
<td>10-year = 8.18 in</td>
</tr>
<tr>
<td></td>
<td>25-year = 10.4 in</td>
<td>25-year = 10.4 in</td>
</tr>
<tr>
<td></td>
<td>50-year = 12.2 in</td>
<td>50-year = 12.2 in</td>
</tr>
<tr>
<td></td>
<td>100-year = 14.1 in</td>
<td>100-year = 14.1 in</td>
</tr>
</tbody>
</table>
As indicated in Table 6, it is anticipated that due to the tillage, cultivation, maintenance, and maturation of the pastures, needed to ensure that adequate grass growth and management of stormwater occurs on fields used for grazing dairy cattle, the condition of the pastures will be improved. As a result, stormwater runoff flows from existing conditions are not expected to be significantly impacted, and will slightly reduce. The proposed dairy is not expected to significantly impact drainage conditions and peak flow patterns on the farm.
Kikuyu grass, which will be planted on each of the paddocks on the farm, will be carefully managed, monitored, and maintained. Grassed waterways will be used to drain paddocks, and vegetated filter strips with riparian herbaceous cover will be provided along water courses and ditches to provide water quality protection and improved bio-filtration and infiltration.

4.5 Proposed Drainage Infrastructure
Due to the agricultural nature of the project, drainage infrastructure will be limited to surface improvements including but not limited to:

- Filter Strip (393)
- Grassed Waterway (412)
- Sediment Basin (350)
- Stream Crossings (578)
- Surface Drainage – Field or Ditch (607)
- Surface Drainage – Main or Lateral (608)
- Water and Sediment Control Basin (638)

Conservation Practice Number in (Parenthesis)

Design and installation of these drainage improvements will be governed by the NRCS-reviewed and SWCD-approved Conservation Plan for the Hawai‘i Dairy Farms project. An agricultural exemption from U.S. Army Corps of Engineers – Section 404 Permitting (For regular maintenance work in waters of the U.S.) applies to NRCS Standard Practice Codes.

Because much of the original agricultural infrastructure from the sugar plantation is largely still in place, improvements to the existing drainage infrastructure, such as the cutoff and main ditches, pipe crossings, and outlets are not anticipated. Existing ditches will be maintained or restored, where required, to improve stormwater runoff conveyance capacities, while vegetation will be restored to improve stormwater quality from runoff entering the ditches.
5 REFERENCES

5.1 County of Kauai


5.2 State of Hawai‘i

• *Water Pollution Control, NPDES Permitting Requirements*, HAR Chapter 11-55, Appendix C, State of Hawai‘i, Department of Health, amended November 2014.

5.3 U.S. Department of Agriculture

FIGURES
Figure 1 – Vicinity Map
Figure 2 – Project Location Map
Hydrologic Assessment for the Pasture Areas, Hawaiʻi Dairy Farms

May 9, 2016

Figure 3 – USGS Map
Figure 4 – Water Resources
Figure 5 – Soils Map

Legend
Soil Types
- HsD: Hanamaulu silty clay, 15 - 25 % slopes
- HTE: Hanamaulu stony silty clay, 10 to 35 % slopes
- KEHF: Kalapa very rocky silty clay, 40 - 70 % slopes
- KavB: Kaena clay, brown variant, 1 - 6 % slopes
- KavC: Kaena clay, brown variant, 6 - 12 % slopes
- KdF: Kalapa silty clay, 40 - 70 % slopes
- Ke: Kalihi clay
- LuB: Lualualei clay, 2 - 6 % slopes
- PdA: Pakala clay loam, 0 - 2 % slopes
- PdC: Pakala clay loam, 2 - 10 % slopes
- Ws: Waikomo stony silty clay

Figure 6 – Paddock Map
Hydrologic Assessment for the Pasture Areas, Hawai`i Dairy Farms

May 9, 2016

Figure 7 – Farm Map
Figure 8 - Existing Hydrology Exhibit

Mahaulepu Ditch (East)
Area = 1179.2 acs
CN (weighted) = 68

Mahaulepu Ditch (West)
Area = 598.3 acs
CN (weighted) = 72

Discharge Point
Mahaulepu Ditch (West)
Q(2) = 702.4 cfs
Q(10) = 1,813.1 cfs
Q(25) = 2,586.6 cfs
Q(50) = 3,226.2 cfs
Q(100) = 3,907.3 cfs

Discharge Point
Mahaulepu Ditch (East)
Q(2) = 1,195 cfs
Q(10) = 3,319.5 cfs
Q(25) = 4,846.1 cfs
Q(50) = 6,109.9 cfs
Q(100) = 7,461.0 cfs

Discharge Point to
Pacific Ocean

Legend
- Project Boundary
- TMK Boundary
- Roads
- Mahaulepu Ditch West Hydrology Boundary
- Mahaulepu Ditch East Hydrology Boundary
- NHDFlowline
  - Canal/Ditch
  - Stream/River

Existing Field Office

Existing Irrigation
Pivot #1

Existing Irrigation
Pivot #2

Existing Grass
Trials

Discharge Point
Project/Fence Boundary

Existing
Grass
Trials

Existing
Grass
Trials

Discharge Point
Mahaulepu Ditch (East)
Area = 1179.2 acs
CN (weighted) = 68

Discharge Point
Mahaulepu Ditch (West)
Area = 598.3 acs
CN (weighted) = 72
Figure 9 - Proposed Hydrology Exhibit

Mahaulepu Ditch (East)
Area = 1179.2 acs
CN (weighted) = 68

Mahaulepu Ditch (West)
Area = 598.3 acs
CN (weighted) = 69

Discharge Point
Mahaulepu Ditch (West)
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Q(10) = 1,661.2 cfs
Q(25) = 2,422.5 cfs
Q(50) = 3,053.9 cfs
Q(100) = 3,730.2 cfs

Discharge Point
Mahaulepu Ditch (East)
Q(2) = 1,126.5 cfs
Q(10) = 3,218.5 cfs
Q(25) = 4,732.3 cfs
Q(50) = 5,991.3 cfs
Q(100) = 7,331.2 cfs

Discharge Point to Pacific Ocean

Legend
- Lease Boundary
- TMK Boundary
- Farm Roads
- Mahaulepu Ditch West Hydrology Boundary
- Mahaulepu Ditch East Hydrology Boundary
- Wells
- NHD Flowline

- Canal/Ditch
- Stream/River
APPENDICES
## Hydrograph Peak/Peak Time Table

### Sub-areas

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### Existing Conditions

Kauai County, Hawaii

HDF - Entire Farm

Hydrograph Peak/Peak Time Table

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HDF - Entire Farm

Kauai County, Hawaii

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| REACHES           | 1723.30 | 4873.95 | 7146.33 | 9036.32 | 11054.11 |

OUTLET
This environmental document is prepared pursuant to Hawai‘i Revised Statutes, Chapter 343, Environmental Impact Statement Law and Chapter 200 of Title 11, Administrative Rules, Department of Health, Environmental Impact Statement Rules.

HAWAI‘I DAIRY FARMS

DRAFT ENVIRONMENTAL IMPACT STATEMENT

VOLUME 3
COMMENTS AND RESPONSES TO THE EISPN - PART A

SUBMITTED BY:

Hawai‘i Dairy Farms
MAHA‘ULEPU, KAUA‘I

MAY 2016
This environmental document is prepared pursuant to Hawai‘i Revised Statutes, Chapter 343, Environmental Impact Statement Law and Chapter 200 of Title 11, Administrative Rules, Department of Health, Environmental Impact Statement Rules.
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- Department of Education
- Hawai‘i State Library
- Hawai‘i Documents Center
- Hawai‘i Kai Regional Library
- Hilo Regional Library
- Kahului Regional Library
- Kaimuki Regional Library
- Kāne‘ohe Regional Library
- Legislative Reference Bureau
- Library of the Department of Business, Economic Development, and Tourism
- Lihu‘e Regional Library | X
- Pearl City Regional Library
- University of Hawai‘i Hamilton Library
- University of Hawai‘i at Hilo
- Edwin H. Mo‘okini Library
- University of Hawai‘i
- Kaua‘i Community College Library | X
- University of Hawai‘i, Maui College Library

#### I. Community Interest Groups and Individuals

| Contractors Association Kaua‘i | X |
| Friends of Māhā‘ulepū | X | X |
| Grove Farm | X | X |
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AGENCIES
Jeff and Laura,

On January 27, 2015, NOAA Fisheries Pacific Islands Regional Office received an Environmental Impact Statement Preparation Notice (EISPN) for our review and comments from the planning consultant group, Group 70 International, Inc., and the approving agency, the State of Hawaii Department of Health for the Hawaii Dairy Farm project. The proposed site, which is located on the Island of Kauai, in the Koloa District, consists of 578 acres of agriculture zoned land on Mahaulepu Road.

The proposed project would establish and operate a zero-discharge, grass-fed dairy, utilizing a sustainable, pasture-based rotational grazing system. The herd size would be based on nutrient uptake by the cows, with the initial herd size limited to under 700 cows, but at full-scale operation the herd size could be as high as 2,000 cows. The primary food source for the herd would be through propagation of Kikuyu and Kikuyu-Guinea grasses which would be fertilized to promote growth by using diluted nutrient waters from the dairy's waste settling pond. The 578 acres of land used for the dairy would be divided into approximately 118 fenced paddocks (4.5 - 5.0 acres each).

As part of the project, Hawaii Dairy Farms would construct facilities for the operation, including barn and milking parlor, cow walkways, and farm roads, effluent settling and storage ponds, livestock water distribution system, storage tanks, operations buildings and an office space. The project proponent anticipates that facilities development will take approximately 10 months. Initial operations would begin with up to 699 cows, with expansion of the herd to occur over a period of several years based on performance.

According to the EISPN, the project proponent will prepare an EIS that will consider 4 alternatives: the No-Action Alternative, a Confined Dairy Alternative, an Alternative Dairy Location, and the preferred alternative described above. The EISPN also describes the Environmental Setting that would be considered in the Draft EIS. NOAA would like to offer comments specific to several of the topics listed under the Environmental Settings for you to consider while developing the Draft EIS for the Hawaii Dairy Farm project.

1. Surface Water Resources - The EISPN indicates that existing and future drainage conditions will be presented in the Draft EIS. NOAA suggest that the Draft EIS consider including management measures that will reduce sediment transport and offer measures that will avoid or minimize the runoff and discharge.

2. Roadway and Traffic - The EISPN indicates that current traffic conditions, construction traffic and operational traffic will be presented in the Draft EIS. NOAA suggest that the Draft EIS consider the potential for runoff and sedimentation from the increase in impermeable surfaces that will come with this development, and include management measures that can be implemented to avoid or minimize sedimentation and runoff.

3. Drainage and Storm Water Runoff - The EISPN indicates that existing and future drainage conditions will be presented in the Draft EIS. NOAA suggest that the Draft EIS consider including management measures that will reduce sediment transport and offer measures that will avoid or minimize the runoff and discharge.

4. Water Supply - The EISPN indicates that the water system and water use will be described. NOAA suggest that the Draft EIS consider analyzing the likely changes in hydrology that may occur from the dairy operation, especially if the change results in a significant increase in fresh water being discharged into the marine environment.

NOAA would like to thank you for your efforts at early coordination and the opportunity to provide comments on the EISPN for the proposed Hawaii Dairy Farm project, and we look forward to reviewing the Draft EIS for this project when it becomes available. Feel free to contact us at your convenience if we can be of assistance in any way as you move forward with this project.

--
Richard Hall
Fishery Policy Analyst
Pacific Islands Regional Office
NOAA Inouye Regional Center
1845 Wasp Blvd., Building 176
Honolulu, HI 96818
808-725-5018
Mr. Richard Hall
Fishery Policy Analyst
NOAA Inouye Regional Center
1845 Waipouli Boulevard, Building 176
Honolulu, Hawai‘i 96818

Dear Mr. Hall:

Thank you for your input dated January 30, 2015 on the Hawai‘i Dairy Farms (HDF) Environmental Impact Statement Preparation Notice (EISPN). We acknowledge your comments and provide the following responses.

1. **Surface Water Resources**
   
   Surface water impacts were analyzed as part of the Draft EIS report. Technical studies were conducted on both baseline water quality conditions and the potential for HDF operations to impact groundwater. The full description of process and findings is in the Draft EIS, Section 4.17, Surface Water Resources & Nearshore Marine Environment, and Appendices E and F. Analysis of potential impacts included nutrient application to the site. The pasture-based rotational grazing system focuses on growing a locally available feedstock - grass - that will provide 70 percent of more of the dairy herd’s diet. Nutrient requirements for the pasture grass is greater than the nutrients available from both manure in the field and from the effluent ponds, for the committed herd size of 699 mature dairy cows. Therefore, supplemental commercial fertilizer will be required to provide sufficient nutrients to sustain the pasture grass at the site.

   Cow manure deposited in the pastures will provide organic matter and release nutrients to the grass thatch and soils. Supplemented nutrients will be provided from effluent captured from the milking parlor and stored in ponds until applied to the field. Additional commercial fertilizer will make up the nutrient requirements. Soluble nutrients will enter the pasture grass and be incorporated into the soil profile with the help of microbials and biological processes within the soil. The grass will uptake the majority of nutrients provided, with few passing through the pasture grass turf and soil profile.

   The technical studies on nutrients and the hydrology of the site provide an estimate of the potential nutrient pass-through to groundwater based on projected nutrients to be applied by the dairy. The estimate assumes two percent of total nitrogen and one percent of phosphorus could potentially pass through to high level groundwater. The alluvium material that makes up the Māhāulepū Valley floor has poor permeability; nutrients move very slowly in groundwater. Surface water is estimated to carry three times than the nutrients in groundwater moving through the alluvium. Groundwater within the alluvium can move to surface water during wet periods when the groundwater body rises and intersects deep drainage ditches and on farm floodplain. Roadside events will result in a modest amount of discharge from groundwater into the on-site ruckle.

   Mitigation includes setbacks to minimize impacts to waterways from surface flow due to stormwater runoff and surface flow. Stormwater runoff will be established in keeping with the Natural Resources Conservation Service (NRCS) technical guidance and standards, as well as those established by the University of Hawai‘i at Mānoa as the local land grant college.

2. **Roadways and Traffic.**
   
   The Hawai‘i Dairy Farms facilities will occupy an area of 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Therefore, minimal improvements to the site and operations will be conducted in accordance with the Conservation Plan, best management practices, and will utilize Natural Resource Conservation Service technical guidance and conservation practice standards.

3. **Drainage and Stormwater.**
   
   Gutter, curbs and swales will be used within the dairy facility to direct surface water flow as a part of the overall site storm water management plan. Metal roofing material on dairy buildings will be sloped to adequately sized gutters and downspouts. Roof run-off from the implement shed, milking parlor, and covered section of the holding yard will be discharged at ground level directly to grass surrounding the buildings. Run-off from a 1.75-acre area within the facility, primarily uncovered areas with the potential for mure.
will be routed to the storage ponds. This includes the loading area, the uncovered part of the holding yard, calving shed roofs, and the area immediately surrounding the effluent ponds. The pond edge will be above grade to prevent run-off from outside areas from entering the ponds.

A Stormwater Pollution Prevention Plan (SWPPP) has been developed for the site to document controls and best management practices to avoid, control, and trap potential erosion associated with construction activities. The SWPPP is required as part of the application for the NPDES – Construction Stormwater General Permit, and specifies any discharge in compliance with relevant regulations.

Over the long-term, the surface water quality will be improved by active management of the dairy site. Cultivation of a grass thatch for complete vegetative cover throughout the dairy paddocks will capture and utilize rainfall, and improved soil tilth will increase water infiltration.

Fences will be erected along the 35-foot setbacks to exclude cows from the buffer areas; vegetation along the buffer will trap soil particles and organic debris in order to minimize inputs to stormwater runoff. Vegetation in and adjacent to the ditches will be maintained to control overgrowth and minimize ditch bank soil erosion.

4. Water Supply. Long-term groundwater supply impacts are not anticipated to be significant. Once fully operational, the dairy will utilize 30,000 gallons per day of groundwater from on-site wells for potable uses: livestock water; and sanitation in the milking parlor. The demands of approximately 30,000 gallons per day (0.03 MGD) for potable water for the 699 mature cows and 84,800 gallons per day (0.08 MGD) for the contemplated herd size of up to 2,000 mature cow are both well within the capacity of the existing onsite Māhūlepūl 14 well which produced 3 MGD during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

Long-term groundwater supply impacts are not anticipated to be significant. The shallow groundwater aquifer underlying the dairy farm property is a separate waterbody in clay alluvium deposits and is not connected to the deep water aquifer in unweathered volcanic rock. An assessment determined there is no hydrologic connection between the aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Thus nutrients added by the dairy operation will have no impacts to the County drinking water well and potable water within the deep volcanics.
Mr. Jeffrey H. Overton

for the following species: two endangered arthropods, the Kauai cave wolf spider (Adelocosa anopa) and the Kauai cave amphipod (Spelaeorchestia koloana) (hereafter collectively referred to as arthropods), and an endangered plant, ohia (Steinbecka tomentosa). We provide the following comments which include recommendations to avoid and minimize project impacts to listed species, candidate species, and critical habitat.

Hawaiian Waterbirds and Hawaiian Goose

The EISPN states that Hawaiian waterbirds and Hawaiian geese are known to utilize water features around the HDF parcel. Our information suggests that considerable numbers of Hawaiian waterbirds frequent the project area. The Service recommends you incorporate the following measures into your project description to avoid and minimize impacts to Hawaiian waterbirds and Hawaiian geese.

Waterbirds and geese may be attracted to the effluent settling and storage ponds as well as managed pastures. Waterbirds and geese attracted to sub-optimal habitat may suffer adverse impacts, such as predation and/or reduced reproductive success, and thus the project may create an attractive nuisance. Measures to minimize their attraction to ponds, such as covering or enclosing the ponds, should be considered. To minimize predation and/or reduced breeding success of waterbirds and geese using pastures, a predator control program should be implemented to control non-native predators, such as feral cats and rats.

Injury or mortality of adults and juveniles may potentially occur due to entanglement or collision with fencing and/or collision with vehicles on farm roads. Additional details on fencing are necessary to assess potential impacts to Hawaiian waterbirds and Hawaiian geese. Electric fencing (commonly used to control movement of cows in pastures) should not be used for fencing as part of the proposed project. To minimize potential collision with vehicles, the Service recommends you install signage near roadways to warn drivers (e.g., farm workers and visitors) to be wary of birds in the areas.

Under certain environmental conditions, Clostridium botulinum, a bacteria commonly occurring in nutrient-rich substrate, may produce toxins that when ingested by Hawaiian waterbirds or Hawaiian geese can result in paralysis and most often mortality (referred to as avian botulism). The EISPN states that 100% of manure from up to 2,000 dairy cows will be treated and applied to fertilizer pasture grasses. The spraying of pastures with decaying animal materials will promote a nutrient-rich bacterial substrate. We recommend you work with us so that we may assist you in developing measures to avoid fostering conditions that promote avian botulism and a monitoring plan for early detection and response.

Displacement and/or loss of nests may potentially occur during project construction and operation (e.g., clearing areas, grading, and mowing of pastures). To minimize and avoid impacts due to displacement and/or loss of nests, we recommend the following measures:

- A biological monitor should conduct Hawaiian waterbird and Hawaiian goose nest surveys at the proposed project site prior to project initiation.
- Any documented nests or broods within the project vicinity should be reported to the Service within 48 hours.

We reviewed the information you provided and pertinent information in our files, including data compiled by the Hawaii Biodiversity and Mapping Program, as it pertains to federally listed species and designated critical habitats. The following species are known to occur or transit through the proposed project area: the endangered Hawaiian black-necked stilt (Himantopus mexicanus knudseni), Hawaiian moorhen (Gallinula chloropus sandvicensis), Hawaiian coot (Fulica atra), Hawaiian duck (Anas wyvilliana) (hereafter collectively referred to as Hawaiian waterbirds); the threatened Hawaiian goose (Branta sandvicensis); the endangered Hawaiian hoary bat (Lasiurus cinereus semotus); and the endangered Hawaiian petrel (Pterodroma sandvicensis); the threatened Newell's shearwater (Puffinus alexandri newelli), and a candidate for listing the band-rumped storm-petrel (Oceanodroma castro) (hereafter collectively referred to as seabirds). The proposed project area is in the vicinity of designated critical habitat.
A 100-foot buffer should be established and maintained around all active nests and/or broods until the chicks have fledged. No potentially disruptive activities or habitat alteration should occur within this buffer.

The Service should be notified immediately prior to project initiation and provided with the results of pre-construction Hawaiian seabird and Hawaiian goose surveys.

A biological monitor(s) should be present on the project site during all construction activities, earth moving activities, land clearing/disking activities, and mowing of pastures to ensure that waterfowl or goose nests are not adversely impacted.

If a Hawaiian waterbird or Hawaiian goose is observed within the project site, or flies into the site while activities are occurring, the biological monitor should halt all activities within 100 feet of the individual(s). Work should not resume until the Hawaiian waterbird(s) or goose leave the area on their own accord.

A post-construction report should be submitted to the Service with 30 days of the completion of the project. The report should include the results of surveys, the location and outcome of documented nests, and any other relevant information.

We suggest the draft EIS provide additional information on effluent ponds (e.g., number, location, and sizes), fencing materials and site layout, fertilization practices (e.g., effluent treatment, application amounts, frequency), outline measures to avoid and minimize the various potential impacts described above, and examine potential impacts that may occur as a result of establishment and operation of the HDF project.

Hawaiian Hoary Bat
The Hawaiian hoary bat roosts in both exotic and native woody vegetation and, while foraging, will leave young unattended in "nursery" trees and shrubs when they forage. If trees or shrubs suitable for bat roosting are cleared during the breeding season, there is a risk that young bats could inadvertently be harmed or killed. To minimize impacts to the endangered Hawaiian hoary bat, woody plants greater than 15 feet (4.6 meters) tall should not be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June 1 through September 15). Site clearing should be timed to avoid disturbance to Hawaiian hoary bats in the project area.

Additionally, Hawaiian Hoary bats forage for insects from as low as three feet to higher than 500 feet above the ground. When harbed wire is used for fencing, Hawaiian hoary bats can become entangled. Barred wire should not be used for fencing as part of the proposed project.

Seabirds
Seabirds, including the Newell’s shearwater, Hawaiian petrel, and band-rumped storm petrel fly at night and are attracted to artificially-lighted areas resulting in disorientation and subsequent fallout due to exhaustion. Seabirds are also susceptible to collision with objects that protrude above the vegetation layer, such as utility lines, guy-wires, and communication towers. Additionally, once grounded, they are vulnerable to predators and are often struck by vehicles along roadways. We recommend the following minimization measures be incorporated into your project description:

- Construction activities should only occur during daylight hours. Any increase in the use of nighttime lighting, particularly during peak fallout period (September 15 through December 15), could result in additional seabird injury or mortality.

If exterior facility lights cannot be eliminated due to safety or security concerns, then they should be positioned low to the ground, be motion-triggered, and be shielded and/or fall cut-off. Effective light shields should be completely opaque, sufficiently large, and positioned so that the bulb is only visible from below.

The draft EIS should examine potential impacts to the Newell’s shearwater, Hawaiian petrel, and band-rumped storm petrel that may occur as a result of construction and the operational use exterior lights associated with the proposed project.

Utility poles and overhead lines may constitute a collision hazard for seabirds as they traverse the ocean and their breeding colonies. Additional information on the design of the proposed utility system for the development, including the number of utility poles, length of powerline, configuration of powerlines, and height of utility poles and overhead powerlines, in the area is necessary to assess the potential impacts to seabirds. We suggest the draft EIS provide this additional information as well as determine whether undergrounding power lines in the proposed development area is feasible to avoid impacts to seabirds. If it is not feasible to underground power lines or install power lines at or at the below the vegetation layer, other measures to minimize the potential for seabird collision should be analyzed in the draft EIS (e.g., vertical versus horizontal arrays, etc.).

Arthropods
The Kauai cave wolf spider and the Kauai cave amphipod are found only on the island of Kauai in the Kolou area from four to six caves respectively. They occur in small, subterranean spaces, voids, and crevices, requiring a woody debris food source. Cave ecosystems are threatened by contamination from surface sources of toxic chemicals from spills, pesticides, and waste disposal which enter caves via streams and/or ground-water seepage. The proposed HDF site is hydrologically linked to the sensitive cave habitats. We recommend the draft EIS address any project components that have the potential to impact the critical habitat (e.g., wastewater and pasture fertilization practices) and minimize potential disturbance.

Sesbania tomentosa
Sesbania tomentosa occurs on the coast located southeast of the HDF site. The primary threat to the species on the island of Kauai is habitat degradation caused by competition with various introduced plant species, including but not limited to buffelgrass (Cenchrus ciliaris), swollen fingergrass (Chloris barbata), sourgrass (Digitaria sanguinalis), and roadside (Leucaena leucocephala). Other threats include lack of adequate pollination, fire, destruction by off-road vehicles, other human disturbances, and storms. The Service recommends that your draft EIS address any project components that have the potential to impact the critical habitat and minimize potential disturbance.

Under the ESA, take is defined to mean "...to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct." Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by
Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering.

When additional information on the proposed project description becomes available, we recommend you contact our office early in the planning process so that we may further assist you with ESA compliance. If it is determined that the proposed project may affect federally listed species or critical habitat, the project proponent(s) should coordinate with us under section 10 of the ESA or consult with us pursuant to section 7 of the ESA as follows. If the proposed project is funded, authorized, or permitted by a Federal agency, then that agency should consult with us pursuant to section 7(a)(2) of the ESA. If no Federal agency is involved with the proposed project, the applicant should apply for an incidental take permit under section 10(a)(1)(B) of the ESA. A section 7 permit application must include a habitat conservation plan that identifies the effects of the action on listed species and their habitats, and defines measures to mitigate and minimize adverse effects.

Additionally, we recommend you incorporate the attached best management practices into your project description to avoid and minimize impacts to water resources that have the potential to occur during establishment and construction of the proposed project.

We appreciate your efforts to conserve protected species. If you have questions regarding this letter, please contact Adam Geierser, Endangered Species Biologist (phone: 808-285-8261).

Sincerely,

Aaron Nadig
Island Team Manager
Oahu, Kauai, North Western Hawaiian Islands, and American Samoa

cc: Laura McIntyre, HDOH

U.S. Fish and Wildlife Service
Recommended Standard Best Management Practices

The U.S. Fish and Wildlife Service (USFWS) recommends the following measures to be incorporated into project planning to avoid or minimize impacts to fish and wildlife resources. Best Management Practices (BMPs) include the incorporation of procedures or materials that may be used to reduce either direct or indirect negative impacts to aquatic habitats that result from project construction-related activities. These BMPs are recommended in addition to, and do not over-ride any terms, conditions, or other recommendations prepared by the USFWS, other federal, state or local agencies. If you have questions concerning these BMPs, please contact the USFWS Aquatic Ecosystems Conservation Program at 808-792-9400.

1. Authorized dredging and filling-related activities that may result in the temporary or permanent loss of aquatic habitats should be designed to avoid indirect, negative impacts to aquatic habitats beyond the planned project area.

2. Dredging/filling in the marine environment should be scheduled to avoid coral spawning and recruitment periods, and sea turtle nesting and hatching periods. Because these periods are variable throughout the Pacific islands, we recommend contacting the relevant local, state, or federal fish and wildlife resource agency for site specific guidance.

3. Turbidity and siltation from project-related work should be minimized and contained within the project area by silt containment devices and curtailing work during flooding or adverse tidal and weather conditions. BMPs should be maintained for the life of the construction period until turbidity and siltation within the project area is stabilized. All project construction-related debris and sediment containment devices should be removed and disposed of at an approved site.

4. All project construction-related materials and equipment (dredges, vessels, backhoes, silt curtains, etc.) to be placed in an aquatic environment should be inspected for pollutants including, but not limited to: marine fouling organisms, grease, oil, etc., and cleaned to remove pollutants prior to use. Project related activities should not result in any debris disposal, non-native species introductions, or attraction of non-native pests to the affected or adjacent aquatic or terrestrial habitats. Implementing both a litter-control plan and a Hazard Analysis and Critical Control Point plan (HACCP – see http://www.haccp-nrm.org/Wizard/default.aspx) can help to prevent attraction and introduction of non-native species.

5. Project construction-related materials (fill, revetment rock, pipe, etc.) should not be stockpiled in, or in close proximity to aquatic habitats and should be protected from erosion (e.g., with filter fabric, etc.), to prevent materials from being carried into waters by wind, rain, or high surf.

6. Fueling of project-related vehicles and equipment should take place away from the aquatic environment and a contingency plan to control petroleum products accidentally spilled during the project should be developed. The plan should be retained on site with the person responsible for compliance with the plan. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of accidental petroleum releases.

7. All deliberately exposed soil or under-layer materials used in the project near water should be protected from erosion and stabilized as soon as possible with geotextile, filter fabric or native or non-invasive vegetation matting, hydro-seeding, etc.
1. Hawaiian Waterbirds and Hawaiian Goose. There is no critical habitat for any endangered waterbird species or nēnē at the HDF site. Nēnē nest in the general Kōloa area, and habitat present on parts of the HDF site is suitable for nesting as nēnē may utilize areas far from water if adequate ground cover vegetation is present. Hawaiian waterbirds and the Hawaiian goose (nēnē) have been observed on the HDF site. Section 4.10 of the Draft EIS describes existing conditions.

Measures will be adopted to avoid and minimize potential effects to seabirds and nēnē from fences and structures. Fencing is discussed in Section 3.5.1 of the Draft EIS. A perimeter fence will be constructed of 42-inch hog wire topped with a strand of straight wire at 48-inch height. Barbed wire will be secured at ground level to deter rooting and entry by feral pigs. Interior paddock fencing will consist of two or three strands of electric wire mounted on wooden t-posts. Electric fences are more effective than wire fences at keeping cattle within paddocks. Fence design and construction will follow NRCS practice codes for the Pacific Islands Region.

Dear Mr. Nadig:

Thank you for your input dated February 23, 2015 on the Hawai'i Dairy Farms Environmental Impact Statement Preparation Notice (EISP). We acknowledge your comments and offer the following responses.

Background research and field surveys conducted by Rana Biological Consulting and AECOS Consultants for Hawai'i Dairy Farms (HDF) are contained in Appendix A of the Draft EIS, and include complete species lists for both flora and fauna observed. Minimization and mitigation measures to reduce impacts to federally protected fauna that could transit or utilize the HDF site are included in Section 4.10, Fauna. As an agricultural project on private lands using private funding, HDF is committed to making a positive impact on food sustainability as well as being a good steward of the land. The dairy's proposed agricultural actions are guided by technical standards and practices of the National Resources Conservation Service (NRCS). HDF retained a qualified NRCS technical service provider to prepare a Conservation Plan for the project, which was approved by the West Kaua'i Soil and Water Conservation District in December 2013. The self-governing soil and water conservation districts are legally constituted sub-units of the Hawai'i state government and are guided by unpaid volunteers who contribute their time and effort to preserve natural resources and enhance the quality of life in their communities. HDF will utilize standards and technical guidance from NRCS and maintain dialogue with the West Kaua'i Soil and Water Conservation District.

Critical habitats for endangered species exist within the Kōloa-Po'ipū area, but do not extend to the HDF site located in the upper Māhā'ulepū Valley. Various protected seabird species may overfly the site; the endangered Hawaiian hoary bat may transit the property. No threatened or endangered flora exists on the site, which has been in commercial sugarcane cultivation since 1878.

Following are responses to the specific comments in your letter.

1. Hawaiian Waterbirds and Hawaiian Goose. There is no critical habitat for any endangered waterbird species or nēnē at the HDF site. Nēnē nest in the general Kōloa area, and habitat present on parts of the HDF site is suitable for nesting as nēnē may utilize areas far from water if adequate ground cover vegetation is present. Hawaiian waterbirds and the Hawaiian goose (nēnē) have been observed on the HDF site. Section 4.10 of the Draft EIS describes existing conditions.

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Construction activities such as clearing and grubbing have the potential to disturb nesting waterbirds, nests, eggs, and young. A qualified biologist will survey for nesting waterbirds and nēnē prior to and during construction. For ongoing operations, HDF will develop an Avian Species Protection Plan (APP) to include mitigation measures and methods to avoid impacts to waterbirds and nēnē. These measures will include recognition of field conditions that could promote avian botulism, and methods to counteract such potential conditions. Hawai'i Dairy Farms will provide endangered species awareness training to contractors and employees related to both construction and dairy operations. Speed limits will be posted and enforced on the dairy site.

Potential measures to protect endangered birds from collisions during construction include lowering cranes at night, marking tall structures and fencing with white visibility polytape, limiting nighttime lighting, and shielding outside lights. The full list of construction mitigation measures to be implemented is presented in EIS Section 4.10.

Effluent ponds will be surrounded by non-vegetated surfaces which are not expected to provide appropriate cover for nesting birds. Should birds be attracted to the effluent ponds, HDF will cover the ponds.

2. Hawaiian Hoary Bat. It is likely that Hawaiian hoary bats overfly the project area on a seasonal basis. Potential impacts to bats from development typically occur during the clearing and grubbing phases of construction where mature vegetation is removed. At the HDF site, there are no suitable roost trees. Entanglement of bats with fencing will be mitigated by using only a single strand of barbed wire at ground level to deter feral pigs. No impacts to bats are expected.

Mr. Aaron Nadig, Island Team Manager, US Fish and Wildlife Service
Hawai'i Dairy Farms Environmental Impact Statement
May 26, 2016
Page 2 of 4
4. Seabirds. Seabirds that nest in upland areas of Kaua‘i may overfly the site. In keeping with best management practices, outside lights used at night will be shielded to prevent uplighting and possible disorientation of seabirds.

5. Arthropods. A study of invertebrate species and pest insects was conducted in January 2016 by Steven Lee Montgomery, PhD, Consulting Biologist. The entire study is included in DEIS Appendix B. There are no known caves or lava tubes found at or adjacent to the dairy farm property. The Kīloa Lava Tube System, which provides habitat for two endemic cave species, the Kaua‘i Cave Wolf Spider and the Kaua‘i Cave amphipod, is located several miles away from the dairy farm property. Both invertebrates are listed as endangered under the U.S. Endangered Species Act. Not all caves in the Kīloa area contain these invertebrates, as most caves in the Kīloa District do not contain the optimal climatological conditions required by these organisms.

A groundwater engineer determined that the HDF site has no hydrologic connection to the deep volcanic series lavas. Neither the botanical and faunal survey nor the invertebrate survey revealed any evidence of lava tubes or caves on the property, and no such features have been reported for the area near the HDF site. Thus no cave invertebrate species will be affected by the dairy farm.

6. Endangered Plant - Sesbania tomentosa. Critical Habitat for the endangered ‘ōhai (Sesbania tomentosa) has been designated along the entire Māhe‘ulepu‘e shoreline. ‘Ōhai is typically found in dry, coastal areas below 2,500 feet elevation, though on Kaua‘i, ‘ōhai is known from only one population in the Polihale State Park area. No suitable habitat for the ‘ōhai plant exists on the dairy site.

HDF acknowledges the concern of introduced plant species on native habitats. Vegetation on the site is typical of regularly disturbed lowland areas; during a survey of the site’s flora and fauna, only five indigenous species were found among the 115 plant species identified, representing only 4.3 percent of the species on site (EIS Section 4.9.1). Swollen fingergrass, Digitaria insularis, and haole koa are among the weeds identified on site during the survey. A primary project objective is to grow nutritious grass for dairy cows; Kikuyu (Pennisetum clandestinum) will be the dominant grass for the pasture. Native plants with potential to stabilize banks will be encouraged and supplemented as needed to develop vegetated buffer strips 35-feet wide along drainages as part of the Conservation Plan to reduce erosion and stabilize slopes. No long-term impacts to native plant habitats or endangered or threatened plant species will occur as a result of the dairy.
From: Kauanoe.M.Hoomanawanui@hawaii.gov
Sent: Monday, February 02, 2015 8:02 AM
To: HDF; laura.mcintyre@doh.hawaii.gov
Cc: Mauna Kea Trask; kyap@gayandrobinson.com
Subject: Kauai Niihau Island Burial Council Consultation

Follow Up Flag: Follow up
Flag Status: Flagged

Aloha e Jeff & Laura,

We have received correspondence regarding Hawaii Dairy Farms; Notice of Preparation of Environment Impact Statement and would like the opportunity to make comment through the commissions process. Our next scheduled Kaua‘i Niihau Island Burial Council meeting is scheduled for February 18, 2015 to be held at the DOT-Conference here in Puhi, Kaua‘i Island beginning at 9 am.

Please let me know if you are able to present the mitigation measures associated with HDF agricultural operations at Maha‘ulepu, Kaua‘i.

Should you have any questions or concerns please contact myself or the cc’d KNIBC Chairperson Keith Yap and Vice Chairperson Mauna Kea Trask.

Ahui Hou,

Kauanoe M Hoomanawanui
Burial Sites Specialist
State of Hawaii
Department of Land and Natural Resources
Historic Preservation Division
P.O. Box 1729
Lihue, HI 96766
cell: (808) 896-0475
e-mail: Kauanoe.M.Hoomanawanui@hawaii.gov

"iwi o ku u iki ki ku ki ki li ki ma o a mau loa"

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MEMORANDUM

Ms. Kauanoe M. Hoomanawanui, Burial Sites Specialist, DLNR, SHPD

Ms. Kauanoe M. Hoomanawanui, Burial Sites Specialist, DLNR, SHPD

Hawai'i Dairy Farms Environmental Impact Statement  May 26, 2016

Page 2 of 2

This response letter accompanies your copy of the Draft Environmental Impact Statement for the following project:

Hawai‘i Dairy Farms - Proposed Dairy Farm, North Kohala, Island of Hawai‘i

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

cc: Hawai‘i Dairy Farms - Proposed Dairy Farm, North Kohala, Island of Hawai‘i
Hawai‘i State Department of Health, Environmental Planning Office

Group 70 International, Inc.

02-16-15

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Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

cc: Hawai‘i Dairy Farms - Proposed Dairy Farm, North Kohala, Island of Hawai‘i
Hawai‘i State Department of Health, Environmental Planning Office

Group 70 International, Inc.

02-16-15
February 19, 2015

Mr. Russell Y. Tsuji
Land Administrator
State of Hawai‘i
Department of Land and Natural Resources
Post Office Box 621
Honolulu, Hawaii 96809

Subject: Hawai‘i Dairy Farms Environmental Impact Statement (EIS) Preparation Notice
Māhāulepū, Kōloa District, Kaua‘i, Hawai‘i
Response to Comment on EISPN

Dear Mr. Tsuji:

Thank you for your input dated January 26, 2015 on the Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice (EISPN). We acknowledge that the Land Division – Kaua‘i District has no comments at this time.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEOC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEOCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.
Jeffrey H. Overton, AICP, LEED AP
Principal Planner

cc: Hawai‘i Dairy Farms
Hawai‘i State Department of Health,
Environmental Planning Office
Steve Molmen – Supervising Land Agent, Kaua‘i District
February 19, 2015

Dear Mr. Overton and Ms. McIntyre,

SUBJECT: Hawai’i Dairy Farms, Notice of Preparation of Environmental Impact Statement

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources’ (DLNR) Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comments.

At this time, enclosed are comments from (1) Land Division – Kauai District; and (2) Engineering Division. No other comments were received as of our response date. Should you have any questions, please feel free to call Supervising Land Agent Steve Molmen at 587-0439. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosure(s)
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD Russell Y. Tanig
REF: EISPN for Hawaii Dairy Farms, Kulou District
Kauai

COMMENTS

(1) We confirm that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Zone X. The National Flood Insurance Program (NFIP) does not regulate developments within Zone X.
(2) Please note that the project site according to the Flood Insurance Rate Map (FIRM), is located in Zone X.
(3) Please note that the correct Flood Zone Designation for the project site according to the Flood Insurance Rate Map (FIRM) is.
(4) Please note that the project must comply with the rules and regulations of the National Flood Insurance Program (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR), whenever development within a Special Flood Hazard Area is undertaken. If there are any questions, please contact the State NFIP Coordinator, Ms. Carol Tsutsumi, of the Department of Land and Natural Resources, Engineering Division at (808) 587-0257.

Please be advised that 44CFR indicates the minimum standards set forth by the NFIP. Your Community’s local flood ordinance may prove to be more restrictive and thus take precedence over the minimum NFIP standards. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP Coordinators below:
(1) Mr. Mario S. Li at (808) 768-3191 of the City and County of Honolulu, Department of Planning and Permitting.
(2) Mr. Frank DeMarco at (808) 961-4042 of the County of Hawaii, Department of Public Works.
(3) Mr. Carolyn C. A. Trub at (808) 726-7253 of the County of Maui, Department of Planning.
(4) Mr. Stanford Iwasato at (808) 341-4200 of the County of Kauai, Department of Public Works.

The applicant should include project water demands and infrastructure required to meet water demands. Please note that the implementation of any State-sponsored projects requiring water service from the Honolulu Board of Water Supply systems must first obtain water allocation credits from the Engineering Division before it can receive a building permit and/or water meter.

Additional Comments:

Other:

Should you have any questions, please call Mr. Dennis Inada of the Planning Branch at 587-0257.

Signed: Carter Chang, Chief Engineer
Date: 12/15
Subject: Hawai‘i Dairy Farms Environmental Impact Statement (EIS) Preparation Notice
Malahulele, Kōloa District, Kaua‘i, Hawai‘i
Response to Comment on EISPN

Dear Mr. Chang:

Thank you for your input dated January 26, 2015 on the Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice (EISPN). We acknowledge that the project site is located in Zone X per the Flood Insurance Rate Map, and that the National Flood Insurance Program does not regulate developments within this zone.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”:
http://tinyurl.com/OEQCKAUA1

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

cc: Hawai‘i Dairy Farms
Hawai‘i State Department of Health, Environmental Planning Office

GROUP 70 INTERNATIONAL

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

March 12, 2015

via email: HDF@Group70Int.com

Group 70 International, Inc.
Attn: Jeff Overton, Principal Planner
925 Bethel Street, 5th Floor
Honolulu, Hawaii 96813-4307

State of Hawaii, Department of Health
Environmental Planning Office
Attn: Laura McIntyre, Program Manager
919 Ala Moana Boulevard, Rm. 312
Honolulu, Hawaii 96814

via email: Laura.McIntyre@deo.hawaii.gov

Dear Mr. Overton and Ms. McIntyre,

SUBJECT: Hawai‘i Dairy Farms, Notice of Preparation of Environmental Impact Statement

Thank you for the opportunity to review and comment on the subject matter. In addition to the comments sent to you dated February 13 and March 3, 2015, enclosed are additional comments from the Commission on Water Resource Management on the subject matter. Should you have any questions, please feel free to call Supervising Land Agent Steve Molmen at (808) 587-0435. Thank you.

Sincerely,

Russell Y. Tsuji
Land Administrator

Enclosure(s)
May 26, 2016

Mr. Jeffrey T. Pearson
Deputy Director
State of Hawai‘i
Department of Land and Natural Resources
Commission on Water Resource Management
P.O. Box 621
Honolulu, HI 96809

Subject: Hawai‘i Dairy Farms Environmental Impact Statement (EIS) Preparation Notice
Māhāulepū, Kōloa District, Kaua‘i, Hawai‘i
Response to Comment on EISPN

Dear Mr. Pearson:

Thank you for the input provided by Commission on Water Resource Management dated March 4, 2015 on the Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice (EISPN). The Hawai‘i Dairy Farms project will not require any Stream Channel Alteration Permits as it will not alter the bed and/or banks of any stream channel. The project will not require a Stream Diversion Works Permit as no stream diversion work will be required for this project, and no Petition to Amend the Interim Instream Flow Standard will be required, as there are no new or expanded diversions of surface water planned for this project.

1. Status of Onsite Wells. Well No. 5425-001 is listed in records as one of the original ten wells in the Well 14 Battery. All of these were abandoned in place in 1928 when the battery was modified with new wells and above ground line shaft turbine pumps. Of the four new wells that were drilled in 1927-28, only three were able to be found. These three remaining wells will serve as the main source of potable water for the project. This information was provided by groundwater consultant Tom Nance Water Resource Engineering (TNWRE); the full assessment is Appendix E of the Draft EIS.

2. Potable Water Wells Near the HDF Site. The Hawai‘i Dairy Farms site is comprised of portions of three TMK parcels, and occupies just 557-acres in total (Section 3.1 and Figure 3.1-2 of the Draft EIS). Well No. 5425-015 is referred to as Kōloa F well in the Draft EIS, and is the closest public water source to the project. The three wells onsite were given State numbers 5425-12, 5425-13 and 5425-14. Known as the Māhāulepū 14 wells, the closest of these wells is located 4,500 feet from the Kōloa F well. The Kōloa F taps into the volcanics of the west valley wall, at an approximate depth of 247 feet below sea level; the Māhāulepū 14 well reaches approximately 447 feet below sea level.

HDF has agreed to a 1,000-foot buffer from the Kōloa F well in which no grazing and no application of nutrients will occur, even though the groundwater assessment confirmed no hydrologic connection between shallow groundwater in the alluvium and groundwater in deep volcanics.

If there are any questions, please contact Dean Uyeno of the Stream Protection and Management Branch at 587-0234 or Ryan Imata of the Ground Water Regulation Branch at 587-0225.

Sincerely,

[Signature]

GROUP 70 INTERNATIONAL

May 26, 2016

Mr. Jeffrey T. Pearson
Deputy Director
State of Hawai‘i
Department of Land and Natural Resources
Commission on Water Resource Management
P.O. Box 621
Honolulu, HI 96809

Subject: Hawai‘i Dairy Farms Environmental Impact Statement (EIS) Preparation Notice
Māhāulepū, Kōloa District, Kaua‘i, Hawai‘i
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Dear Mr. Pearson:

Thank you for the input provided by Commission on Water Resource Management dated March 4, 2015 on the Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice (EISPN). The Hawai‘i Dairy Farms project will not require any Stream Channel Alteration Permits as it will not alter the bed and/or banks of any stream channel. The project will not require a Stream Diversion Works Permit as no stream diversion work will be required for this project, and no Petition to Amend the Interim Instream Flow Standard will be required, as there are no new or expanded diversions of surface water planned for this project.

1. Status of Onsite Wells. Well No. 5425-001 is listed in records as one of the original ten wells in the Well 14 Battery. All of these were abandoned in place in 1928 when the battery was modified with new wells and above ground line shaft turbine pumps. Of the four new wells that were drilled in 1927-28, only three were able to be found. These three remaining wells will serve as the main source of potable water for the project. This information was provided by groundwater consultant Tom Nance Water Resource Engineering (TNWRE); the full assessment is Appendix E of the Draft EIS.

2. Potable Water Wells Near the HDF Site. The Hawai‘i Dairy Farms site is comprised of portions of three TMK parcels, and occupies just 557-acres in total (Section 3.1 and Figure 3.1-2 of the Draft EIS). Well No. 5425-015 is referred to as Kōloa F well in the Draft EIS, and is the closest public water source to the project. The three wells onsite were given State numbers 5425-12, 5425-13 and 5425-14. Known as the Māhāulepū 14 wells, the closest of these wells is located 4,500 feet from the Kōloa F well. The Kōloa F taps into the volcanics of the west valley wall, at an approximate depth of 247 feet below sea level; the Māhāulepū 14 well reaches approximately 447 feet below sea level.

HDF has agreed to a 1,000-foot buffer from the Kōloa F well in which no grazing and no application of nutrients will occur, even though the groundwater assessment confirmed no hydrologic connection between shallow groundwater in the alluvium and groundwater in deep volcanics.

If there are any questions, please contact Dean Uyeno of the Stream Protection and Management Branch at 587-0234 or Ryan Imata of the Ground Water Regulation Branch at 587-0225.

Sincerely,

[Signature]
3. Estimated Water Demand for the Dairy Project. HDF is committed to establishing a herd of up to 699 mature milking cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. At the committed herd size, the dairy will utilize 30,000 gallons per day of potable groundwater from on-site wells for livestock water and sanitation in the milking parlor. At the discretion of HDF, should it choose to expand operations up to 2,000 mature dairy cows, the potable water demand would increase by 54,800 gallons per day, for a total of 84,800 gallons per day. The hydrologic assessment determined that the modest potable water demand by HDF from the remaining onsite wells (referred to as the “Māhāulepū 14 wells”) will not adversely impact the County’s Kōloa F well. See the Draft EIS, Section 4.16 for a full discussion of hydrology and groundwater in Māhāulepū.

Non-potable water will be sourced from Waita Reservoir. Irrigation demand, the primary use of non-potable water, is estimated conservatively for planning purposes at 2.26 million gallons per day.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

cc: Hawai‘i Dairy Farms
Hawai‘i State Department of Health, Environmental Planning Office

Hawai‘i Dairy Farms, LLC.
P.O. Box 1690
Koloa, Hawai‘i 96756-1690

January 16, 2015

To Whom It May Concern:

SUBJECT: Comments on Environmental Impact Statement – Preparation Notice
Hawai‘i Dairy Farms
Mahaulepu, Island of Kauai, Hawai‘i

The Department of Health (DOH), Clean Water Branch (CWB), acknowledges your request for comments on your project. The DOH-CWB has reviewed the subject document and offers these comments. Please note that our review is based solely on the information provided in the subject document and its compliance with the Hawaii Administrative Rules (HAR), Chapters 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program. We recommend that you also read our standard comments on our website at: http://health.hawaii.gov/epofiles/2013/05/Clean-Water-Branch-Std-Comments.pdf.

1. Any project and its potential impacts to State waters must meet the following criteria:
   a. Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.
   b. Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.
   c. Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).

2. You may be required to obtain National Pollutant Discharge Elimination System (NPDES) permit coverage for discharges of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55).

For NPDES general permit coverage, a Notice of Intent (NOI) form must be submitted at least 30 calendar days before the commencement of the discharge. An application for a NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge. To request NPDES permit coverage, you must submit the applicable form (“CWB Individual NPDES Form” or “CWB NOI Form”).
May 26, 2016

Mr. Alec Wong, P.E.
Chief
State of Hawai'i
Department of Health
Clean Water Branch
Post Office Box 3378
Honolulu, Hawai'i 96801-3378

Subject: Hawai'i Dairy Farms Environmental Impact Statement (EIS) Preparation Notice
Mahâulepu, Kekaha District, Kaua'i, Hawai'i
Response to Comment on EISPN

Dear Mr. Wong:

Thank you for your input dated January 16, 2015 on the Hawai'i Dairy Farms (HDF) Environmental Impact Statement Preparation Notice (EISPN). We acknowledge your comments and provide the responses below.

1. Criteria for State Waters. The project will meet the applicable criteria found in the State's Antidegradation Policy (HAR Section 11-54-1.1), Designated Uses (HAR Sections 11-54-3), and Water Quality Criteria (HAR Sections 11-54-4 through 11-54-8).

2. National Pollutant Discharge Elimination System (NPDES). Best management practices are described in Section 4.17, Surface Water Resources & Nearshore Marine Environment. These practices will be documented in the Stormwater Pollution Protection Plan to be submitted as part of the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit.

3. Work Not Affecting Waters of the United States. Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Future farm improvements are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads with application of best management practices.

4. State Water Quality Standards. HDF will not contribute to any exceedance of State Water Quality Standards. HDF occupies a 557-acre area within a sub-watershed of approximately 2,700 acres.

Marine Research Consultants, Inc. (MRCI) collected baseline data on biological and chemical constituents within surface waters and open ocean coastal waters downgradient of the HDF site. Twelve surface water sampling sites were established to collect data to provide a baseline and for future monitoring. Results of surface water analysis indicate that nutrients from surrounding lands, containing...
some leachate drain into the ditches on the HDF site. However, analysis of samples show that by the time surface water reached sampling sites closer to the ocean, nutrient levels had returned to those similar to the mauka sampling stations above the HDF site.

During the rainfall and runoff events, the dairy’s nutrient contributions would be further diluted by additional volume of surface runoff and ditch flows. The terminus of Waiopili Ditch is a deep, muddy basin that joins the ocean through a channel cut through beach sand. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline. MRCI concluded there will be no substantial effects to marine water quality from the HDF dairy.

A Sanitary Survey prepared for the Māhāulepū sub-watershed by the State of Hawai‘i Clean Water Branch describes the surface water terminating near the shoreline at the end of Waiopili Ditch is not a recreational body of water. Further, the Sanitary Survey found no significant impact to the Waiopili Ditch from any activity that can be attributed to the dairy.

In compliance with national and State Clean Water regulations, HDF will institute appropriate controls and procedures to manage stormwater during construction, and to minimize the potential for non-point pollution in stormwater run-off. Both management controls and structural controls will be implemented in the short-term. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; prohibiting leaking or poorly-maintained construction equipment and machinery; and keeping adjacent public, paved streets free of dirt and mud. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Following construction, controls will include establishment of buffer zones and setbacks. Best management practices include setbacks to minimize impacts to waterways. HDF will not graze cows or apply effluent within 1,000-feet of the Kōloa F wells, in agreement with the County Department of Water. Throughout the HDF site, effluent application setbacks totaling 100 feet in width – 50 feet from the top of either side of a waterway – will keep nutrient applications away from waterways. Vegetative buffers totaling 70 feet in width – 35 feet on either side measured from the top of the agricultural ditches – will be to improve and maintain water quality and reduce erosion. Fences will be erected along the 35-foot setbacks to exclude cows from the buffer areas; vegetation along the buffer will trap soil particles and organic debris in order to minimize inputs to stormwater runoff. Vegetation in and adjacent to the ditches will be maintained to control overgrowth and minimize ditch bank soil erosion.

5. HDF notes your comment regarding non-compliance, fines, and penalties.
Aloha Laura,

No comments/concerns from Sanitation at this time.

Peter Oshiro
Environmental Health Program Manager
Sanitation/Food and Drug/Vector Control
Phone # (808) 586-8020
peter.oshiro@doh.hawaii.gov

May 26, 2016

Mr. Peter Oshiro
Environmental Health Program Manager
State of Hawai‘i
Department of Health
Sanitation Branch
591 Ala Moana Blvd.
Honolulu, Hawai‘i 96813

Subject: Hawai‘i Dairy Farms Environmental Impact Statement (EIS) Preparation Notice
Māhāulepū, Köloa District, Kaua‘i, Hawai‘i
Response to Comment on EISP

Dear Mr. Oshiro:

Thank you for your input dated January 13, 2015 on the Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice (EISP). We acknowledge that the Sanitation Branch has no comments at this time.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

cc: Hawai‘i Dairy Farms
Hawai‘i State Department of Health,
Environmental Planning Office
May 26, 2016

Mr. Nolan S. Hirai, P.E.
Manager
State of Hawaii
Department of Health
Clean Air Branch
Post Office Box 3378
Honolulu, Hawaii 96801-3378

Subject: Hawai‘i Dairy Farms Environmental Impact Statement (EIS) Preparation Notice
Māhāulepū, Kōloa District, Kaua‘i, Hawai‘i
Response to Comment on EISPN

Dear Mr. Hirai:

Thank you for your input dated March 19, 2015 on the Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice (EISP).

1. Fugitive Dust. We acknowledge your comments that the construction and operations of the Dairy Farm must comply with the provisions of Hawai‘i Administrative Rules (HAR) §11-60.1-33 regarding Fugitive Dust. As a part of the DEIS, existing air quality conditions and project impacts were evaluated, including dust, odor, and greenhouse gas (GHG) production. A full year of meteorological data (for 2014) was obtained for the project site. Depicted on a windrose, the data shows predominant winds from the northeast.

2. Dust Control Measures – Construction Period. Short-term impacts may consist of exhaust emissions from construction equipment and increased vehicular activity during the construction phase, and fugitive dust emissions during soil excavation. Vehicular access to the site during construction will include limited delivery of construction materials and heavy equipment for site work, and daily vehicle access to the site by construction workers. Short-term construction dust will be reduced through implementation of dust control measures as recommended by DOH Clean Air Branch, including using water to control dust on disturbed surfaces and haul roads, limiting the disturbed area at any given time, and/or mulching or stabilizing inactive areas that have been worked, and establishing and monitoring speed limits for trucks on-site.

3. Dust Control Measures – Long Term Operations. Long-term impacts from dairy operations would create particulate matter (PM) in the form of dust. Fugitive dust concentrations were modeled for HDF by applying the PM rates from available literature, which measured PM from a “dry lot” used for traditional confinement dairies. Using these dust rates in the model, therefore, over-estimate the potential quantity of PM, because HDF will utilize a pasture-based system. The HDF system will have cows off pasture just two hours each day.

We also recommend that the Environmental Impact Statement address potential nuisance odor impacts to nearby communities and the mitigation measures that will be employed.

If you have any questions, please contact Mr. Barry Ching of the Clean Air Branch at 586-4200.

Sincerely,

NOLAN S. HIrai, P.E.
Manager, Clean Air Branch

BC:ng

Hawaii Dairy Farms, LLC
Laura McIntyre, Environmental Planning Office, Department of Health
Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM\textsubscript{10} and PM\textsubscript{2.5}) measured on the island of O'ahu. This was considered the total impact and was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 milking cows was modeled, as at the lower threshold of 699 cows the potential fugitive dust impact would be negligible.

Modeling using the higher fugitive dust rates resulted in 0.6 tons per year for the 699 herd size. PM emissions modeled from HDF operations will not exceed State standards. This analysis is further described in Draft EIS Section 4.19.

The estimated concentration for PM\textsubscript{10} is 2.01 μg/m\textsuperscript{3} per 24-hour period, which is well below the State standard of 150 μg/m\textsuperscript{3}. The estimated concentration for PM\textsubscript{2.5} is 0.23 μg/m\textsuperscript{3} per 24-hour period, which is well below the Federal standard of 35 μg/m\textsuperscript{3}.

The total annual particulate matter emissions were modeled to be 0.6 tons per year for a herd size of 699 mature dairy cows, and 3.3 tons per year for a potential future contemplated herd size of up to 2,000 mature dairy cows. The project will not require any permits under the Clean Air Act, or State of Hawaii counterpart.

4. Odor Control. Odor refers to the combined effects of a mixture of gases on the sense of smell. Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF. Air dispersion models were used to determine potential odor levels based on the dairy facility design and established modeling methods. Local weather data was used in conjunction with the AERMOD (version 1) modeling system to evaluate odors documented for dairy heifers and effluent ponds.

Modeling results mapped an odor isopleth which displays the area in which odor may be detected by 50 percent of the sensitive population 44 hours out of every year. The extent of detectable odors for the committed herd size of 699 mature dairy cows may extend up to 1,670 feet south of the site under the worst case scenario when winds are light. Should HDF decide in the future to increase the herd size up to 2,000 mature dairy cows, the isopleth extend to 2,780 feet south of HDF. This would reach into the adjoining farm lands, but remains far from resort and residential areas.

The modeling considers the worst-case meteorological conditions, so it is likely odor detection beyond the HDF boundaries will be less frequent. Best Management Practices to reduce odor impacts include establishment of a windbreak. Windbreaks, also known as shelterbelts, are used for a variety of purposes including reduction and interception of airborne odors. For additional analysis, please see Draft EIS Section 4.19.
Dear Mr. Overton:

Subject: Environmental Impact Statement Preparation Notice

Hawai'i Dairy Farms, Mahāulepū, Kōloa District, Kaua'i, Hawai'i
TMK (4) 2-9-003: 001 portion and 006 portion

Thank you for your input dated March 25, 2015 on the Hawai'i Dairy Farms Environmental Impact Statement Preparation Notice (EISPN). We have several treatment individual wastewater systems (IWSS) (septic tanks) files in our database system. For development consideration, please show all existing structures and treatment IWSS and animal wastewater management systems on the final plot map including setback distances to any newly adjusted property lines and/or buildings. We await the preparation of both the Draft Environmental Impact Statement (EIS) and Final EIS for wastewater treatment and disposal plans for review.

All wastewater plans must conform to applicable provisions of the Hawaii Administrative Rules, Chapter 11-62, "Wastewater Systems." Should you have any questions, please contact Mr. Mark Tomomitsu, Supervisor, Planning & Design Section, Wastewater Branch at number (808) 586-4300.

Sincerely,

SINA PRUDER, P.E., CHIEF
Wastewater Branch

May 26, 2016

Ms. Sina Pruder, P.E.
Chief
State of Hawai'i
Department of Health
Wastewater Branch
Post Office Box 3378
Honolulu, Hawai'i 96801-3378

Subject: Hawai'i Dairy Farms Environmental Impact Statement (EIS) Preparation Notice

Mahāulepū, Kōloa District, Kaua'i, Hawai'i
Response to Comment on EISPN

Dear Ms. Pruder:

Thank you for your input dated March 25, 2015 on the Hawai'i Dairy Farms Environmental Impact Statement Preparation Notice (EISPN).

1. Critical Wastewater Disposal Area. We acknowledge your comments that the project is located in a critical wastewater disposal area as determined by the Kaua'i County Wastewater Advisory Committee. Please see below regarding the individual wastewater system to be utilized at the site. Livestock waste effluent ponds will be designed in compliance with the University of Hawai'i's Guidelines for Waste Management.

2. Conformance with HAR Ch. §11-62. All wastewater plans will conform to applicable provisions of Hawai'i Administrative Rules §11-62, "Wastewater Systems." The project plans to utilize a Department of Health-approved septic system for a flow of 700 gpd, with a 1,500 gallon capacity septic tank. The facilities, structures and effluent ponds are described in Draft EIS Section 3.3 – Dairy Site Requirements and Layout.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai'i Dairy Farms": http://tinyurl.com/OEQCKAUAI
Thank you for your participation in the environmental review process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

cc: Hawai‘i Dairy Farms
Hawai‘i State Department of Health, Environmental Planning Office
May 26, 2016

Mr. Ford N. Fuchigami
Director of Transportation
State of Hawai‘i
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Subject: Hawai‘i Dairy Farms Environmental Impact Statement (EIS) Preparation Notice Māhāulepū, Kōloa District, Kaua‘i, Hawai‘i
Response to Comment on EISPN

Dear Mr. Fuchigami:

Thank you for your input dated February 9, 2015 on the Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice (EISPN). We acknowledge a permit for the transport of oversized and/or overweight materials and equipment on State highway facilities would be required from the DOT Highways Division, Kaua‘i District Office.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

cc: Hawai‘i Dairy Farms
Hawai‘i State Department of Health, Environmental Planning Office
and county plans, policies, and controls. The analysis should include a discussion on the project’s ability to meet the objectives and policies listed in HRS Chapter 226.

2. OP is the lead agency for the Hawaii Coastal Zone Management Program. The coastal zone management area is defined as "all lands of the State and the area extending seaward from the shoreline to the limit of the State’s police power and management authority, including the U.S. territorial sea" see HRS § 205A-1 (definition of "coastal zone management area").

The Draft EIS should include a statement that discusses the proposed project’s ability to meet the objectives and policies set forth in HRS § 205A-2. This statement should be included in a section of the Draft EIS that examines how this project conforms or is in conflict with state and county plans, policies, and controls. Where a conflict or inconsistency exists with the Hawaii CZM objectives and policies, the statement must describe the extent to which the applicant has reconciled its proposed action with HRS § 205A-2. These objectives and policies include: recreational resources, historic resources, scenic and open space resources, coastal ecosystems, economic uses, coastal hazards, managing development, public participation, beach protection, and marine resources.

3. Although not listed in Section 5.0, page 5-1 of the EISPN, it appears portions of the parcel planned for dairy farm and grass pasture use may lie within the Special Management Area (SMA) delineated by the County of Kauai. The planning departments of the various county administrations are charged with assessing the requirements for SMA use. Please confirm with the County of Kauai’s Planning Department to make a determination on whether the parcel lies in relation to the designated SMA, and whether a SMA permit is required for this project.

4. The parcel area chosen for this project is within a relatively close distance of coastal and marine resources including the coastline, the Kiwai Kai watershed, and a riverine wetland system. Additionally, because of the wet and periodic stormy climate of the Koloa district, coastal pollution is a concern. Pollution runoff, and in particular the vegetated treatment systems that may be employed in grass pasture production, may have nonpoint pollution impacts on Kauai’s coastal resources. The Draft EIS should include an analysis of the proposed management control methods for mitigating pollution runoff. For guidance, please review the Hawaii Watershed Guidance, which provides information on management measures that may be implemented to minimize coastal nonpoint pollution. Specifically, Section 5.1, pages 73-80, covers management measures for confined animal facilities, manure and runoff storage, grazing, and irrigation waters. The Watershed Guidance can be viewed or downloaded from the Office of Planning website at http://files.hawaii.gov/dbedt/op/zn/zn/initiative/nonpoint/HI_Watershed_Guidance_Final.pdf.

5. OP’s Special Plans Branch is the lead program for the preparation of the Hawaii Comprehensive Economic Development Strategy (CEDS). One of the major goals of the 2010 CEDS, was increased food security and energy self-sufficiency. An October 2012 CEDS State Strategic/Functional Plan study, “Increased Food Security and Food Self-Sufficiency Strategy,” detailed the importance of increasing local food production intended for local consumers. The Draft EIS should include an analysis of the project’s consistency with this food self-sufficiency strategy. The food security and self-sufficiency strategy can be viewed or downloaded from the Office of Planning website at http://files.hawaii.gov/dbedt/op/spb/INCREASED_FOOD_SECURITY_AND_FOOD_SELF_SUFFICIENCY_STRATEGY.pdf.

If you have any questions regarding this comment letter, please contact Josh Heleki of our office at (808) 587-2845.

Sincerely,

Acting Director

[Signature]

Leo R. Asuncion
controls; prohibiting leaking or poorly-maintained construction equipment and machinery; and keeping adjacent public, paved streets free of dirt and mud. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Subject: Hawai’i Dairy Farms Environmental Impact Statement (EIS) Preparation Notice
Måähuulepü, Köloa District, Kaua’i, Hawai’i

Response to Comment on EISPN

Dear Mr. Asuncion:

Thank you for your input dated February 18, 2015 on the Hawai’i Dairy Farms Environmental Impact Statement Prepar ation Notice (EISPN). We acknowledge your comments and provide the responses below.

1. Hawai’i State Plan. Compliance with the Hawai’i State Plan is described in the Draft EIS Chapter 5, Plans and Policies. Sections of Hawai’i Revised Statutes (HRS) Chapter 226 supported by the Hawai’i Dairy Farms project are indicated in Table 5-2 of the Draft EIS Section 5.3. The project conforms with applicable sections of HRS Chapter 226.

2. Coastal Zone Management Program. Hawai’i Dairy Farms is located within the Coastal Zone Management Area (SMA). The Special Management Area (SMA) permitting system is part of the CZM Program approved by Federal and State agencies. When CZM first became law in 1975, the legislature established the SMA regulatory function at the county level, and the Kaua’i Planning Commission is the authoritative agency in the County of Kaua’i. Based on County of Kaua’i SMA maps of the region, the dairy site area is located outside the Special Management Area. Refer to Figure 4.4-2 in the Draft EIS.

3. Special Management Area (SMA). The Special Management Area (SMA) of the Coastal Zone Management Program approved by the Federal and State agencies. When CZM first became law in 1975, the legislature established the SMA regulatory function at the county level, and the Kaua’i Planning Commission is the authoritative agency in the County of Kaua’i. Based on County of Kaua’i SMA maps of the region, the dairy site area is located outside the Special Management Area.

4. Coastal and Marine Resources. In compliance with Federal and State Clean Water regulations, HDF will institute appropriate controls and procedures to manage stormwater during construction, and to minimize potential non-point pollution in stormwater run-off. Both management controls and structural controls will be implemented in the short-term. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural

Further, effluent irrigation will not occur within 50 feet of the ditches. A long-term water quality monitoring program will be instituted to regularly sample and analyze nutrient and bacteriological levels of the surface waters (agricultural ditches and Waiopili Ditch). The monitoring program and methods will be established to meet the CWB quality assurance/quality control requirements. Data from the surface water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua’i community.

As discussed in Draft EIS Sections 4.17 and 4.23, Marine Resources Consultants Inc. completed a Surface Water Quality and Marine Assessment to assess potential impacts from the dairy operations. There will be no adverse long term effects to water quality of the marine environment. The report is included as Appendix F in the Draft EIS.

5. Food Security and Self Sufficiency. The October 2012 Comprehensive Economic Development Strategy State Strategic/Functional Plan study “Increased Food Security and Food Self-Sufficiency Strategy” was instrumental to the sustainable pasture-based rotation dairy project. Between 1984 and 2015, importation of milk to Hawai’i rose from 0 to 90 percent. Conventional feedlot dairy operations face management challenges including costs of imported feed which fluctuate with grain and fuel prices, and the need to store manure in waste impoundment lagoons as a waste product. The pastoral-based dairy utilizes a system to balance needs of the forage (grass) with nutrients provided by manure produced on site.

Hawai’i Dairy Farms’ objectives include providing more than 1 million gallons annually of fresh, nutritious milk for Hawai’i families. This will reduce reliance on imported milk from the mainland U.S. With demonstration of the pasture-based system as an economically and environmentally sustainable model for Hawai’i, HDF will contemplate the possibility of expanding the herd in the future for even greater annual production.
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai’i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

cc: Hawai’i Dairy Farms
    Hawai’i State Department of Health,
    Environmental Planning Office

Dr. Virginia Pressler, M.D., Director
Department of Health
P. O. Box 3378
Honolulu, Hawaii 96801-3378

Dear Dr. Pressler:

Subject: Environmental Impact Statement Preparation Notice
Hawaii Dairy Farms
TMK: 2-9-03: por. 1, por. 6
2-9-01: por. 1
Poipu, Kauai
Area: 579 acres

The Department of Agriculture (DOA) has reviewed the subject document (EISP) and offers the following comments.

Hawaii Dairy Farms, LLC seeks to establish and operate the first zero-discharge, grass-fed dairy in Hawaii, utilizing a sustainable, pasture-based rotational grazing system on an approximately 579-acre farm at Mahuakau, Kauai. The irrigated pasture will be the primary food source and 100 percent of the manure produced will remain on the farm as fertilizer for the pasture grass.

Proposed Action
Following EIS review, the applicant will construct the buildings and support structure over a 10 month period, followed by populating the facility with up to 659 dairy cows. Dairy operations with cow populations in excess of 700 head require additional regulatory review.

The proposed dairy appears to be entirely within the 1,533 acres of Important Agricultural Lands (IAL) designated by the Land Use Commission on May, 2011. We recommend the EIS discuss the relationship of the proposed dairy with other existing and proposed agricultural uses within the Mahuaku area with respect to land use, adequacy of water supply and quality, and other issues that may arise as the dairy establishes then expands its operations. Also, we note that the Mahuakau IAL map (attached) shows a group of lots along the northeastern corner of Mahuakau Road that...
do not appear in the project location map (Application, Figure 1.1, page 1-3). The status and relationship of these lots to the proposed dairy should be discussed.

Required Reviews, Permits and Approvals
The EISPN notes that there are rules of the DOA that the facility has to comply with (page 2-4). The existing reference should be corrected as follows:
- Compliance with Rules for Livestock Facilities Milk Producers and application for a Milk Producer License.

Terrestrial Environment
Surface water and ground water resources (page 3-2)
See our comment on water resources under Proposed Action.

Thank you for the opportunity to review and provide comments on this very important project that promises to improve the State's self-sufficiency in fresh milk production and increase the productive use of the State's Important Agricultural Lands. Should you have any questions, please contact Earl Yamamoto at 973-9466, or email him at earlj.yamamoto@hawaii.gov.

Sincerely,

Scott E. Enright, Chairperson
Board of Agriculture

Attachment: TMK map

c: Milk Control Section-Quality Assurance Division, DOA
Hawaii Dairy Farms, LLC
Non-potable water will be sourced from Wailua Reservoir. Irrigation demand, the primary use of non-potable water, is estimated conservatively for planning purposes at 2.26 million gallons per day.

2. Compliance with Rules for Milk Producers and Application for a Milk Producers License. We also acknowledge the Department of Agriculture reference that has been correctly revised to the Compliance with rules for Milk Producers and application for a Milk Producer License. HDF will comply with the rules and obtain the proper license.

3. Water Resources. The Draft EIS hydrologic assessment determined that the modest potable water demand from the dairy operation, and the distances between the Mahalaula Well 14 well and the County’s Kolotu F well will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Further, the assessment determined there is no hydrologic connection between the aquifer layer deep in the unweathered volcanic series (which is the source of potable water) and the shallow groundwater located within the alluvial material under the valley floor. Groundwater in the alluvium will not impact the County drinking water well.

Over the long-term, the surface water quality in the agricultural ditches and Waiopili Ditch will be improved by active management of the dairy site. Cultivation of a grass thatch for complete vegetative cover throughout the dairy paddocks will minimize currently exposed soils within the site.

Vegetative buffers totaling 70 feet in width – 35 feet on either side measured from the top of the agricultural ditches – will be established in keeping with NRCS Properties immediately surrounding the HDF site are in agricultural use. Several single-family farm lot dwellings are located approximately one mile west of the dairy site’s southwestern corner. The large tracts of farmland with a regional water system such as that maintained by Mahaulepu Farm and Grove Farm, allow for stability in support of farm ventures while providing local residents with a reliable source of employment.

The long-term operation of HDF will be in full compliance with its agricultural State Land Use District designation, and embodies the IAL designation per the Hawai’i State Constitution by using the protected lands in the project area with high quality agricultural soil for their intended purpose of diversified agriculture and agricultural self-sufficiency. HDF will work with surrounding agricultural uses to provide long-term benefit and support of agricultural lands and industry through continued use in keeping with zoning and IAL designation.

Long-term groundwater supply impacts are not anticipated to be significant. Total potable water demand is approximately 30,000 gpd (0.03 MGD) for the committed single-family farm lot dwellings located approximately one mile west of the dairy site’s southwestern corner. The large tracts of farmland with a regional water system such as that maintained by Mahaulepu Farm and Grove Farm, allow for stability in support of farm ventures while providing local residents with a reliable source of employment.

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ongoing testing program will provide feedback to the dairy management team regarding nutrient uptake and to monitor whether bacteriological constituents in the area reach levels of environmental concern. Data from the surface water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

cc: Hawai‘i Dairy Farms
Hawai‘i State Department of Health, Environmental Planning Office

Jeff Overton, Principal Planner
Group 70 International, Inc.
925 Bethel Street, Fifth Floor
Honolulu, HI 96813

Re: Environmental Impact Statement Preparation Notice for the Hawai‘i Dairy Farms
Māhī‘ulepū Ahupua‘a, Kona Moku, Kaua‘i Mokuapu
TMK: (4) 2-9-003:001, (4) 2-9-003:006, (4) 2-9-001:001

Aloha e Jeff Overton:

The Office of Hawaiian Affairs (OHA) is in receipt of your January 20, 2015 letter seeking preliminary comments on the above environmental impact statement preparation notice (EISPN), on the development of the 578 acres of agricultural lands in the Māhī‘ulepū valley area. Hawai‘i Dairy Farms (HDF) is seeking to establish and operate the first zero-discharge, grass-fed dairy in Hawai‘i on Important Agricultural Lands (IAL).

Your letter notes that in the 1970s and 1980s, agricultural lands in this area were reclassified from State Agricultural District to Urban District, and rezoned by the County as a resort area. In the 1980s, there was significant development on the coastline of hotels, timeshare condominiums, single-family resort residences, golf courses, and commercial centers. Concerned with the expansion of the coastline and another resort development, the community prompted to protect the last undeveloped agricultural lands. The remaining 1,533 acres of Māhī‘ulepū coastline was designated and is now classified and protected under IAL, a provision of the Hawai‘i State Constitution (Article XI, Section 3).

There are 1,533 acres of lands that is classified by the State Land Use Commission as IAL. Of this, 578 acres of IAL are being leased by HDF and proposes to construct facilities for the commercial dairy operation, including a barn and milking parlor, cow walkways and farm
May 26, 2016

Mr. Kamana‘opono M. Crabbe, Ph.D.
Ka Pouhana, Chief Executive Officer
State of Hawaii
Office of Hawaiian Affairs
560 N. Nimitz Hwy., Suite 200
Honolulu, Hawaii 96817

Subject: Hawai‘i Dairy Farms Environmental Impact Statement (EIS) Preparation Notice
Māhā‘ulepū, Kōloa District, Kaua‘i, Hawai‘i
Response to Comment on EISPN

Aloha Dr. Crabbe:

Thank you for your input dated February 26, 2015 on the Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice (EISPN).

1. Archaeological Inventory Survey. The Hawai‘i Dairy Farm project is subject to a historic preservation review by the State Department of Land and Natural Resources, SHPD under HRS Chapter 6E and Chapter 13-284. An archaeological inventory survey (AIS) and a cultural impact assessment were conducted for the proposed HDF pastures. Also, the AIS was extended beyond the pasture area on the upslope and found a boulder with petroglyphs and habitation and ceremonial feature. In consultation with State Historic Preservation Division, findings will be properly documented and presented in the draft environmental impact statement.

OHA recommends consultation be initiated with the following individuals and community organizations who may be willing to share their mana‘o with you:

- Wiluna Holi – Cultural Practitioner
- Billy Kaakulelulii – ‘Aha Moku – Kona Moku Representative
- Chipper Wichman – President/CEO National Tropical Botanical Gardens
- Richard Kao Anoah – Cultural Practitioner
- Randy Wichman – Cultural Historian
- Mālama Māhā‘ulepū

We appreciate your efforts to perform the environmental impact statement. OHA suggests that the cultural impact assessment should analyze the impacts and propose mitigation for the project’s impacts to nearby Native Hawaiian sites. As this project moves forward, OHA does request assurances that should ʻiwi kupuna or Native Hawaiian cultural deposits be identified during any ground altering activities, all work will immediately cease and the appropriate agencies, including OHA, will be contacted pursuant to applicable law.

Thank you for the opportunity to submit comments on this EISPN and we look forward to reviewing the draft EIS. Should you have any questions, please contact Kathryn Keala at (808) 394-1648 or katlyn@oha.org.

‘O wai iho nō me ka ‘oia ‘i’o,
Kamana‘opono M. Crabbe, Ph.D.
Ka Pouhana, Chief Executive Officer

KC-kk

C: Dan Ahuna, OHA Kaua‘i & Ni‘ihau Trustee
Kaliko Santos, OHA Kaua‘i Community Outreach Coordinator (via email)
February 20, 2015

Mr. Jeff Overton, Principal Planner
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, HI 96813-4307

Dear Mr. Overton:

Subject: Notice of Preparation of Environmental Impact Statement for Hawaii Dairy Farms, TMK: 2-9-03: por. 1 and por. 6; TMK: 2-9-01: por. 1, Poipu, Kauai

Thank you for the opportunity to comment on the NPEIS for the proposed dairy farm. The Department of Water (DOW) has concerns regarding the possible contamination of our wells located in vicinity of the proposed dairy farm. The DOW would like to recommend that the Applicant perform a comprehensive hydrogeologic study to determine the groundwater contamination potential of the dairy farm activities. The study should include, but shall not be limited to the development of mitigation measures to prevent, monitor, and resolve groundwater contamination.

Thank you for your consideration,

Sincerely,

Kirk Sugi
Manager and Chief Engineer

February 20, 2015

Mr. Jeff Overton, Principal Planner
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, HI 96813-4307

Dear Mr. Overton:

Subject: Notice of Preparation of Environmental Impact Statement for Hawaii Dairy Farms, TMK: 2-9-03: por. 1 and por. 6; TMK: 2-9-01: por. 1, Poipu, Kauai

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Thank you for your consideration,

Sincerely,

Kirk Sugi
Manager and Chief Engineer
May 26, 2016
Mr. Kirk Saiki
Manager and Chief Engineer
County of Kaua'i, Department of Water
4398 Pea Loke St.
P.O. Box 1706
Lihu'e, Hawai'i 96766

Subject: Hawai'i Dairy Farms Environmental Impact Statement (EIS) Preparation Notice
Māhāulepū, Kōloa District, Kaua'i, Hawai'i
Response to Comment on EIS PN

Dear Mr. Saiki:

Thank you for your input dated February 20, 2015 on the Hawai'i Dairy Farms Environmental Impact Statement Preparation Notice (EIS PN).

1. Comprehensive Hydrogeological Study. We acknowledge your comments and have conducted a comprehensive hydrogeological study to determine groundwater potential of the dairy farm activities as part of the Draft EIS.

Tom Nance Water Resources Engineering conducted the groundwater study for the project; the report is enclosed as Draft EIS Appendix E. The assessment determined there is no hydrologic connection between the aquifer layer deep in the unweathered volcanic series (which is the source of potable water) and the shallow groundwater located within the alluvial material under the valley floor. Further, the assessment concludes that the modest potable water demand from the dairy operation, and the distances between the Māhāulepū 14 well and the County's Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

2. Groundwater Study Findings. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. The hydraulic conductivity of permeable flank lavas in the Hawaiian Islands ranges from hundreds to thousands of feet per day, whereas estimates for less permeable dike-intruded lavas range from 1 to 500 feet per day. Permeable lavas, represented by a high hydraulic conductivity, increase the distance contaminated groundwater can travel before pathogens die-off or contaminants can degrade to a point of being benign.

The weathered alluvium of Māhāulepū Valley shows a hydraulic conductivity on the order of 10.5 to 50 feet per day, whereas the adjacent soils of the Kōloa -Poipū region is on the order of 201 to 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area, allowing the remedial properties of soil and associated bacteria to denitrify or otherwise render potential contaminants inert.

3. Monitoring Wells. Four groundwater monitoring wells installed by HDF into the shallow water aquifer within the alluvium will allow monitoring of water quality. Results from the monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua'i community.

4. Farming setback at Kōloa F well. As determined through discussions with the County Department of Water, HDF will not irrigate or graze the lands within a 1,000-foot setback surrounding the Kōloa F County water well. Within this setback, no effluent irrigation water will be applied, no commercial fertilizer will be applied, and no animals will deposit manure.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai'i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

cc: Hawai'i Dairy Farms
Hawai'i State Department of Health, Environmental Planning Office
Dear Ladies and Gentlemen:

RE: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE (EISP/N) - HAWAII DAIRY FARMS

Thank you for this opportunity to comment on the Environmental Impact Statement Preparation Notice (EISP/N) for the proposed Hawaii Dairy Farms at Makaha, Kauai. My comments are submitted in my capacity as a Councilmember of the Kauai County Council.

I am requesting that the following concerns be addressed in the EIS process:

1. The full impact of the Dairy operation on the quality of near shore waters when operating at full capacity over time.

2. The full impact of the Dairy operation on the availability of irrigation water from nearby reservoirs needed for other future agricultural uses when operating at full capacity over time.

3. The full impact of the Dairy operations with regards to "unintended consequences" such as odor drift to nearby residential and resort operations when operating at full capacity over time.

4. What is "plan B" should there be unintended consequences relating to the above in the future? Will there be any controls or requirements causing the dairy to scale back its operations should significant negative impacts occur?

Laura McIntyre, Environmental Planning Office
Re: Environmental Impact Statement Preparation Notice (EISP/N) - Hawaii Dairy Farms
February 23, 2015
Page 2

Thank you for this opportunity to provide comments regarding the Hawaii Dairy Farms Environmental Impact Statement. Should you have any questions, please do not hesitate to contact me at 241-4188.

Sincerely,

Gary L. Hooser
Councilmember, Kauai County Council

AO:to
cc: State of Hawaii, Department of Health
(Via E-mail: Laura.McIntyre@doh.hawaii.gov)
Group 70 International, Inc. (Via E-mail: HDP@Group70intl.com)
Hawaii Dairy Farms, LLC., P.O. Box 1690, Koloa, Hawaii 96756-1690
Dear Councilmember Hooser:

Thank you for your input dated February 23, 2015 on the Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice (EISP). We acknowledge your comments and provide the following responses.

1. Nearshore Ocean Water Quality. A Sanitary Survey prepared for the Māhā‘ulepū sub-watershed by the State of Hawai‘i Department of Health Clean Water Branch describes the Waiopili Ditch as a man-made drainage on private property, and further notes that it is not an inviting recreational body of water utilized by people. The Sanitary Survey found no significant impact to the Waiopili Ditch from any activity that can be attributed to the dairy.

Marine Research Consultants, Inc. (MRCI) collected baseline data on biological and chemical constituents within surface waters and open ocean coastal waters downgradient of the HDF site. The baseline conditions are part of a water quality monitoring program to be established by HDF for groundwater, surface waters and nearshore marine waters. A groundwater engineering firm assessed potential impacts of nutrients from the proposed dairy operation. MRCI utilized the findings of the groundwater assessment to look at potential impacts to the nearshore ocean water quality. The two studies are appended to the Draft EIS.

The ground water body in the alluvium is hydrologically disconnected from the County well water in deep unweathered volcanics. Episodic, seasonal rainfall events cause groundwater in the alluvium to rise and interact with the deep agricultural ditches in the vicinity of HDF monitoring wells 1 and 2. Such episodes are calculated to average 10 days annually, which would result in a modest amount of groundwater containing nutrients to discharge into the surface ditches. The amount of nutrients estimated from HDF operations released to surface water is calculated at 10,000 pounds of nitrogen and 900 pounds of phosphorus annually.

An ongoing water quality monitoring program will be instituted to regularly sample and analyze nutrient levels of the surface waters (agricultural ditches and Waiopili Ditch). The monitoring program and methods will be established to meet the State Department of Health Clean Water Branch (DOHCWB) quality assurance/quality control requirements. The ongoing testing program will provide feedback to the dairy management team regarding nutrient uptake and to monitor whether bacterial constituents in the area reach levels of environmental concern.

Data from the water quality monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

2. Agricultural Water Supply. Total potable water demand is approximately 30,000 gpd (0.03 MGD) for the committed proposed action herd size of up to 699 mature dairy cows. Should HDF decide, in the future, to increase the herd to up to 2,000 mature dairy cows, total potable water demand will total 84,800 gpd (0.085 MGD). The potable water well located on the HDF site provided 3 MGD during the sugarcane plantation era. The demand of approximately 30,000 gallons per day (0.03 MGD) for potable water is well within the capacity of the existing Māhā‘ulepū 14 well source. Additional groundwater resource information is presented in Draft EIS Section 4.16.

Non-potable water will be sourced from Waita Reservoir. Irrigation demand, the primary use of non-potable water, is estimated conservatively for planning.
purposes at 2.26 million gallons per day. The allotment of Waiau Reservoir water to HDF is 3 MGD.

3. Odor Nuisance. Odor refers to the combined effects of a mixture of gases on the sense of smell. Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF. Air dispersion models were used to determine potential odor levels based on the dairy facility design and established modeling methods. Local weather data was used in conjunction with the AERMOD (version 1) modeling system to evaluate odors documented for dairy heifers and effluent ponds.

Modeling results mapped an odor isolopleth which displays the area in which odor may be detected by 50 percent of the sensitive population 44 hours out of every year. The extent of detectable odors for the committed herd size of 699 mature dairy cows may extend up to 1,670 feet south of the site under the worst case scenario when winds are light. Should HDF decide in the future to increase the herd size up to 2,000 mature dairy cows, the isolopleth extends to 2,780 feet south of HDF. This would reach into the adjoining farm lands, but remains far from resort and residential areas.

The modeling considers the worse-case meteorological conditions, so it is likely odor detection beyond the HDF boundaries will be less frequent. Best Management Practices to reduce odor impacts include establishment of a windbreak. Windbreaks, also known as shelterbelts, are used for a variety of purposes including reduction and interception of airborne odors. For additional analysis, please see Draft EIS Section 4.19.

4. Operational Safeguards. HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. The application process for a National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) permit includes public notification and input. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The NRCS Conservation Practice Standard 590 (referred to as Standard 590), Nutrient Management, is applied to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. The timing and application of nutrients should correspond as closely as practical with plant uptake, soil properties and weather conditions.

The NMP is an adaptive management tool. Sometimes described as a “living, breathing document,” the nutrient conditions are constantly monitored and the NMP will be updated as conditions on the dairy mature. The results from soil testing, manure testing, and forage testing will be utilized and inform the carrying capacity of the site, which in turn determines the number of mature dairy cows that can be sustained at the Mālu‘u‘epu site. Tests will be performed annually at a minimum, and more frequent as needed to assist with nutrient management on the farm.

Increases in nutrients as a result of dairy establishment or operations can inform modification of the operation's nutrient management. Modifications to the timing and placement of effluent can be made; the rate of application can change; different crops can be utilized to increase uptake by plants; and the number of cows can be changed. Nutrient management is a dynamic process that is informed by monitoring a number of parameters; the ability to monitor nearby water bodies for changes in nutrients is an additional check that provides data to be publically shared.

A long-term water quality monitoring program has been instituted to regularly sample and analyze nutrient and chemical constituent levels of the shallow groundwater in the alluvium under the HDF site, the surface waters (agricultural ditches and Waiopili Ditch), and the nearshore marine environment downgradient of the HDF site. The monitoring program and methods will meet the CBW quality assurance/quality control requirements. The ongoing testing program will provide feedback to the dairy management team regarding changes in water quality. Data from the water monitoring program will be shared with the DOH CBW, dairy neighbors and the local Kaua‘i community.

The potential for environmental accidents at the dairy farm will be minimal. Reviews and approvals are required from the State Department of Health for the waste management facilities. Standards and regulatory requirements must be met, and capacity beyond the required volumes has been added to provide additional backup storage. A secondary containment system has been designed as an additional safeguard. Risks to surface water quality are minimized with application of best management practices including vegetated buffer zones and 35-foot setbacks to exclude cows from farm drainageways. Effluent irrigation will not occur within 50 feet of agricultural ditches on the farm. Fuels and chemicals utilized at the dairy facilities will be used and stored following established rules and protocols.

Best management practices include setbacks to minimize impacts to waterways. HDF will not graze cows or apply effluent within 1,000-feet of the Kōloa F well, in agreement with the County Department of Water. Throughout the HDF site,
effluent application setbacks totaling 100 feet in width – 50 feet from the top of either side of a waterway – will keep nutrient applications away from waterways. Vegetative buffers totaling 70 feet in width – 35 feet on either side measured from the top of the agricultural ditches – will be to improve and maintain water quality and reduce erosion. Fences will be erected along the 35-foot setbacks to exclude cows from the buffer areas; vegetation along the buffer will trap soil particles and organic debris in order to minimize inputs to stormwater runoff. Vegetation in and adjacent to the ditches will be maintained to control overgrowth and minimize ditch bank soil erosion.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

cc: Hawai‘i Dairy Farms
Hawai‘i State Department of Health,
Environmental Planning Office

Bernard P. Carvalho, Jr.
Managing Director

Nadine K. Nakamura

DEPARTMENT OF PUBLIC WORKS
County of Kaua‘i, State of Hawai‘i
4444 Rice Street, Suite 272, Lihue, Hawai‘i 96766
TEL (808) 241-4992 FAX (808) 241-6604
February 27, 2015

Larry Dill, P.E.
County Engineer

Lyle Tabata
Deputy County Engineer

RECEIVED
MAR - 9, 2015

GROUP 70 INTL

Mr. Jeffery Overton
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawai‘i 96813-4307

SUBJECT: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice (EISP) Hawai‘i Dairy Farms, LLC – Applicant
TMK: (4) 2-9-003; Por. 001 & Por 006; (4) 2-9-0001: Por 001
Kolob District, Island of Kaua‘i
PW 01.15.199

Dear Mr. Young:

The Engineering Division of the Department of Public Works has reviewed the subject EISP dated January 21, 2015 and offers the following comments:

1. Grading and Grubbing. Grading and grubbing operations shall be conducted in accordance with the County’s Grading Ordinance No. 808, an Ordinance Regulating and Controlling Grading, Grubbing, Stockpiling and Soil Erosion and Sedimentation Within the County of Kaua‘i.

2. Roadways and Traffic. As noted in the EISP, current traffic conditions, construction traffic, and operational traffic shall be presented in the Draft Environmental Impact Statement (DEIS). The EISP refers to Koloa Bypass Road; in the DEIS and other documents, this road should be referred to as Ala Kinoki as it is currently named.

3. Drainage and Storm Water Runoff. Pre-development drainage flow volumes and drainage flow patterns must be maintained. The applicant is required to address any increase in storm water runoff generated by the proposed improvements and mitigate drainage impacts in compliance with the County’s Storm Water Runoff System Manual.

An Equal Opportunity Employer
Mr. Jeffery Overton, Group 70 International, LLC  
February 27, 2015  
Page 2

Thank you for providing this opportunity for consultation on this pending project. We look forward to receiving the DEIS. If you have any questions or need additional information, please contact Stanford Iwamoto, Engineering Division at (808) 241-4806.

Very truly yours,

MICHAEL MOULE, P.E.  
Chief, Engineering Division

May xx, 2016

Mr. Michael Moule, P.E.  
Chief, Engineering Division  
County of Kaua‘i  
Department of Public Works  
4444 Rice Street, Suite 275  
Lihue, HI 96766

Subject: Hawai‘i Dairy Farms Environmental Impact Statement (EIS)  
Preparation Notice  
Māhāulepū, Kōloa District, Kaua‘i, Hawai‘i  
Response to Comment on EISPN

Dear Mr. Moule:

Thank you for your input dated February 27, 2015 on the Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice (EISPN). We acknowledge your comments and provide the following responses.

1. Grading and Grubbing. HDF acknowledges that its grading and grubbing operations are to be conducted in accordance with County Grade Ordinance No. 808. Specific plans for best management practices will be implemented to minimize soil erosion and sedimentation.

2. Roadways and Traffic. Traffic analysis of the site and region is presented in Draft EIS Section 4.18 – Roadways and Traffic. On average, traffic in the region is generally lower than most urban areas in the State due to the low population of Kaua‘i and rural agricultural demographics of the Māhāulepū area. Traffic operations along Māhāulepū Road and traffic movements at the project driveways are expected to operate at acceptable levels of service during peak hours of traffic. A total of five employees will be working at the dairy facility when built out, generating 12 additional vehicle trips per day, primarily during weekday morning and afternoon commute periods at the committed 699 herd size, with 23 additional vehicle trips per day, primarily during weekday commute periods at the contemplated 2000 herd size. These additional trips will have a minimal effect on traffic conditions at County roadways in the surrounding area, increasing the total volume of Māhāulepū Road and Ala Kinoiki Road by no more than 0.2% daily.

3. Drainage and Storm Water Runoff. Drainage flow volume impacts are discussed in Draft EIS Section 4.17 – Surface Water Resources. Storm water runoff mitigation measures will be in compliance with County requirements, including the County’s Storm Water Runoff System Manual. Over the long-term, the surface water quality in the agricultural ditches and Waiopili Ditch will be improved by active management of the dairy site. Cultivation of a grass thatch for complete vegetative cover throughout the dairy paddocks will minimize exposed soils within the site.

4. Farming Setback. As determined through discussions with the County Department of Water, HDF will not irrigate or graze the lands within a 1,000-foot...
Mr. Michael Moule, P.E., Chief, Engineering Division, County of Kaua‘i DPW
Hawai‘i Dairy Farms Environmental Impact Statement
May XX, 2016
Page 2 of 2

setback surrounding the Kōloa F County water well. Within this setback, no effluent irrigation water will be applied, no commercial fertilizer will be applied, and no animals will deposit manure.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawai‘i Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

cc: Hawai‘i Dairy Farms
    Hawai‘i State Department of Health,
    Environmental Planning Office
Organizations
February 23, 2015

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Group 70 International, Inc.
325 Bethel Street, Fifth Floor
Honolulu, HI 96813

Dear Mr. Overton:

This statement will outline the numerous reasons why Grove Farm strongly supports the Hawaii Dairy Farm (HDF) project. Since the exit from sugar cane cultivation and processing, Grove Farm has over 200 existing lease agreements with farmers, ranchers, and other businesses. We have been longtime stewards of our water resources and land responsibilities. Thus, considerable and careful thought went into the site selection for HDF’s lease location.

In 2010, Grove Farm, along with a consortium of organizations such as Kamehameha Schools, Parker Ranch, and Maui Land & Pineapple, conducted grass trials statewide to find suitable locations for a grass-fed dairy. Two years of grass trials studies were conducted across various landholdings and Kaua‘i was selected because of the contiguous nature of the area, its Important Agricultural Land (IAL) designation and its optimal growing conditions.

In addition to being over 2 miles away from the nearest residential area, the area was used for decades for a number of cattle operations. Contrary to what has been misrepresented by activist groups, the dairy will be located primarily within the Maha‘ulepu Valley, and not along the coastline.

Lands within the Maha‘ulepu ahupua‘a were first used to grow sugar cane over a century ago. When sugar operations ceased back in the 1900’s, long-time residents may recall that Grove Farm leased the area to a number of cattle ranchers for many decades with no ill effects and no complaints from anyone in the area.

The area has an abundance of good soil, ample sunlight and a valuable water resource with the adjacent Waia Reservoir, which Grove Farm has continued to maintain even though sugar operations ceased in the 1900’s.

Jeffrey H. Overton
February 23, 2015
Page Two

While sugar cultivation faded away decades ago, Grove Farm has proactively continued to invest in dam maintenance, as well as the entire reservoir area. Built over 100 years ago, Waia has been an invaluable water resource on the South Shore. Every year, it conserves millions of gallons of precious water. Waia’s water currently supports operations at the Hārangītū taro farm, Makawahi Cave Reserve, other agricultural tenants, as well as the primary source for the Poipu Bay Golf Course’s irrigation system.

Although Maha‘ulepu was considered for development back in the 1970’s, during the height of development on Kaua‘i, those plans were never finalized. In 2011, we instead decided to designate the Maha‘ulepu Valley as Important Agricultural Lands (IAL). We voluntarily designated the area as IAL in an effort to help preserve and protect Hawaii’s farming industry. Grove Farm strongly believed that the people of Kaua‘i would prefer to have thriving agriculture in the area rather than see the development of hotels or golf courses.

It is important to note that while a 15% “up zoning” credit is included as an incentive to landowners - which allowed for the reclassification of up to 15% of the acreage protected for other uses, such as rural, urban or conservation — we waived our right to claim this benefit.

Grove Farm has recently been accused by activist groups of not treating the area with respect and cultural sensitivity. It is puzzling that activist groups who oppose change and development in the area oppose farming in that area since it has been used for cattle ranching and agriculture for decades.

Many Kaua‘i residents may recall the odor problems associated with the traditional model of confined dairy operations – such as those that existed in Wainee and Moilua several decades ago. However, HDF will not be using that model. To be clear, comparing confinement dairy operations with grass-fed dairy operations is like comparing apples to oranges.

Prior to entertaining the possibility of a 20-year lease, we believed that additional due diligence entailed seeing first-hand the type of New Zealand operation that was envisioned for Kaua‘i. An executive member of our leadership team flew to New Zealand to tour multiple grass-fed dairy operations and observe industry best practices.

While New Zealand did initially encounter a range of different environmental and regulatory impacts decades ago, such mistakes prompted the industry as a whole to change. In 2002, the New Zealand dairy industry made a commitment...
Dear Mr. Haruki:

Thank you for the input dated February 23, 2015 on the Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice (EISPN). We acknowledge your comments about the project, and offer the following responses.

We appreciate your numerous reasons for supporting the Hawai‘i Dairy Farms Project, and your history of Grove Farms activities and endeavors in the region.

HDF seeks to establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as fertilizer for pasture grass to provide the primary source of nutrition. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will provide a local food source appropriate for cow health and quality milk production, and will initially comprise 70 percent of the animals’ diet.

As you are aware, Hawai‘i Dairy Farms (HDF) stepped forward in response to community concerns about the dairy for the Po‘ipū area and offered to prepare a comprehensive Environmental Impact Statement (EIS) for the proposed project. It is the purpose of Hawai‘i’s environmental law, known as HRS Chapter 343 and “HEPA”, to “establish a system of environmental review which will ensure that environmental concerns are given appropriate consideration in decision making along with economic and technical considerations.” The HEPA process includes scoping discussions with regulatory agencies and the community to identify issues of concern. HDF engaged technical consultants to analyze probable impacts on environmental and societal conditions. Relevant local, state and federal ordinances, statutes, and regulations were considered. We believe the EIS demonstrates that this innovative dairy system will benefit the local and statewide community by advancing food sustainability.

HDF is committed to establishing a herd of up to 699 mature dairy cows, and demonstrating the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’

May 26, 2016
Warren H. Haruki
President & CEO
Grove Farm
3-1850 Kaumuali‘i Highway
Lihu‘e, HI 96756

Subject: Hawai‘i Dairy Farms Environmental Impact Statement (EIS) Preparation Notice
Māhā‘ulepū, Kōloa District, Kaua‘i, Hawai‘i
Response to Comments on EISPN
health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. The application process for a National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) permit includes public notification and input. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is currently estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The proposed dairy farm will achieve the objective of increasing current local milk production and bolstering Hawai‘i’s declining dairy industry while reducing reliance on imported milk from the mainland United States. The rotational-grazing dairy system will utilize manure on-site as fertilizer to grow grass, reducing imported fertilizer and feed, and minimizing potential impacts to the environment. The dairy farm will comply with all applicable federal, state, and county policies in regards to land use, environmental protection measures, and other associated regulatory controls.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: "Hawai‘i Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

cc: Hawai‘i Dairy Farms
    Hawai‘i State Department of Health, Environmental Planning Office

February 23, 2015

Laura McIntyre
State of Hawaii, Department of Health
Environmental Planning Office
919 Ala Moana Blvd., Room 312
Honolulu, HI 96814
epo@doh.hawaii.gov

Jeff Overton
Group 70 International
926 Bethel St., 8th Floor
Honolulu, HI 96813
HDF@Group70int.com

Submitted via E-mail to all parties.

Subject: Consulted Party Comments on Preparation Notice of Draft Environmental Impact Statement (EIS) for Hawaii Dairy Farms’ Proposed Dairy Operation

Dear Ms. McIntyre and Mr. Overton,

On behalf of Malama Maha‘ulepu, I would like to thank you for the opportunity to comment on the Preparation Notice for the Hawaii Dairy Farms proposed dairy operation.

Maha‘ulepu, Kaua‘i is one of the island’s natural and cultural crown jewels - the last accessible, undeveloped ahupua‘a on the Southside. From Mount Ha‘upu to the crashing waves of the ocean, it is a cultural landscape within which the natural and human history of millions of years is evident. Maha‘ulepu is a living museum with scenic beauty, unique geology, endangered and threatened species, native Hawaiian sites and stories, agriculture and conservation lands. It is enjoyed by visitors and residents alike for hiking, fishing, limu gathering, diving, and water sports. The area is a vitally needed recreational treat, a source of renewal and reflection, and an iconic representation of the island’s rural, untouched character.

Maha‘ulepu is imperative to conserve not only because it is the last undeveloped coastal area of Kaua‘i’s South Shore but because of the collection of resources at Maha‘ulepu that express 5 million years of natural and human history.

Malama Maha‘ulepu Dairy EIS Preparation Notice Public Comments 1
Non-profit Malama Maha‘ulepu works to protect the irreplaceable natural and cultural resources of this critical landscape and to sustain the experience of the land as an undeveloped area with compatible agriculture, education, cultural practice and recreation. We have sought to carefully balance two goals: maintaining the tradition of historic agriculture and food production and protecting the natural resources of the land and waters. In that spirit we have sought to ensure compatibility for proposed uses of the land - including this dairy. In particular, we have strived for a transparent and understandable framework that protects this community’s land, waters and people. We seek detailed assurance that the infrastructure and operating systems are in place to address basic concerns of water quality, waste management, air quality, pest and odor control, and resource protection.

As we have stated in the past, we are concerned that the dairy could negatively affect the possibility of Maha‘ulepu becoming the cultural landscape and heritage place that we know it is and can be. The Draft EIS must evaluate the impacts of the project on all thresholds, including but not limited to the environmental concerns included below.

**Water Quality:**

Water is the key to the cultural and natural landscape and human experience of Maha‘ulepu; the area’s water resources must be protected from further damage by incompatible land use.

**Hydrology**

The potential impacts on the groundwater, streams and ocean at Maha‘ulepu from the construction of dairy infrastructure and the operation of the dairy are the gravest underlying concern of the community and, certainly, of environmentalists on Kaua‘i and far beyond. Extensive hydrological study and full disclosure of the immediate and long term potential impacts of the dairy to the land and ocean waters of Maha‘ulepu, surroundings and to Koloa-Poipu is critical. The public’s expectations of this study are justifiably high. The hydrological study must depict the connection between the many water features of Maha‘ulepu: the deep aquifer, underground flow of water, streams, springs, wetlands and the ocean. Because Maha‘ulepu is largely undeveloped, the continued vitality of the water system here is evident and valuable in itself.

The risk of pollution to the ground and ocean water seems probable both from disruption by construction activities and especially from nutrient loads on and into the soils.

Agricultural infrastructure includes electrical systems, drip irrigation, drainage improvements, a potable water well, the road way from the milking barn and other structures to Maha‘ulepu Road, and paths from pastures to the milking yard and barn. This construction, some of which has already occurred, may impact subsurface water flow in the valley.

Cow urine and manure and fertilizer for pasture grass cultivation, including both sprayed effluent and surface applications, are on-going operational sources of potential damage to the area’s water quality. The Draft EIS must include extensive hydrological information that can show with certainty that no nutrient of effluent run off will occur. The Draft EIS must establish the depth of the deep and shallow ground water tables throughout the valley and in the adjacent coastal area. The Draft EIS must address the potential for pollution of the Koloa aquifer by infiltration of nitrogen, phosphorous and potassium. The study would, therefore, model soil infiltration rates throughout the 582 acres. A hydrological study would be required for any future expansion of the water resources. (TLCG 2014)

The hydrological study or modeling should encompass the watersheds of Maha‘ulepu and of adjacent Pa‘a, or, at least, of coastal Pa‘a. The ahupua‘a understanding of watersheds as community’s land, waters and people. We seek detailed assurance that the infrastructure and operating systems are in place to address basic concerns of water quality, waste management, air quality, pest and odor control, and resource protection.

**Groundwater**

The dairy is located above and withdraws potable water from the Koloa Aquifer. Since most of the drinking water for Koloa and Poipu comes from the Koloa Aquifer, the short and long term effects of the dairy’s use on the area’s drinking water supply must be understood. The South Kauai Community Plan (SKCP) states that the Koloa aquifer appears more than sufficient for future needs because the aquifer’s sustainable yield is 30 million gallons per day and current pumpage, without the dairy withdrawals, is estimated to be .342 MGD. The SKCP also states, “However, the State Commission on Water Resources Management (CWRM) warns that due to Kaua‘i’s geology it can be difficult to generate a steady supply of water by pumping from the aquifers.” A hydrological study would be required for any future expansion of the water resources. Malam Ma‘aulepu Valley was a valuable water source during the sugar era. By 1898, a plantation camp in the valley existed primarily to keep the water well pumps running. The study should describe the number, location, depth and capacity and status of all historic and currently active wells within Maha‘ulepu and in surrounding areas.
The water quality of Waiopili Stream is already known to be poor. Very high enterococcus counts, reported by the Surfrider Foundation, have resulted in a recent Department of Health assessment of the quality of the water and the possible sources of the pollutants in the stream. Bacterial counts in the stream are certainly important. However, the turbidity and sediment load in the stream are as important to measure and monitor because of their effects on stream biota and on condition of the estuary and the reef. The Draft EIS should address these concerns by forecasting anticipated soil run-off in the valley and requiring stringent mitigative measures in the valley and, if need be, recommending mitigative measures along the stream as it flows beyond the valley and into the ocean.

The hydrological model must include the subsurface flows and drainage. These are less likely to have been altered by sugar cultivation. Since subsurface flow could transport nutrients throughout the valley into the stream system and the ocean, subsurface flow is an important part of the hydrological system.

As an agricultural endeavor, the project’s success depends upon anticipated precipitation and trans-evaporation. This water input should be included in the model, and the impact of climate change on “traditional” wind and rainfall patterns over a 100-year cycle should be factored into the Draft EIS.

The availability of water from Waita Reservoir, depended upon for irrigation, seems critical to this project. Waita draws water from the Huleia and other watersheds. The issue of ensuring sufficient in stream waters for kalo cultivation and for habitat of native species has been litigated on Oahu and Maui. On Kaua‘i, community members, particularly farmers, have organized to have water returned to Eastside streams. Waita should be discussed in the Draft EIS, and particularly the possibility of not being able to take the projected volume of irrigation water from that source should be addressed. Also, other agricultural operations at Maha‘ulepu and Pa‘a depend upon Waita Reservoir for irrigation water. The water needs of these and future potential agricultural enterprises should be factored into discussion of the dairy’s water needs.

Wetlands

Ahupua‘a maps from the 19th century show a wetland area in the middle and southeastern side of the valley, below the taro lo‘i. This wetland was still present, though intermittently, as recently as about a decade ago. The wetland provided seasonal waterbird habitat.

The water table is higher at the coast than in the valley, which is typical in Hawai‘i. In the Makauwahi Cave Reserve fresh water is encountered at 12 feet when archaeologists and paleoecologists and others are excavating within the sinkhole area.

Today, coastal Maha‘ulepu contains both natural and constructed wetlands.

There is a wetland area within the agricultural zoned land mauka of Kawailoa Bay. Kuleana owners tended salt pans in the wetland during the 19th century and into the early 20th century.

In the 1990’s Grove Farm, Inc. envisioned dredging this area for a marina as part of a proposed resort residential complex.

The existence of a small historic fishpond near the Gillin House is more evidence of wetlands and the high water table.

In the nearby Old Maha‘ulepu Quarry, quarrying has created numerous and extensive shallow, fresh water ponds. These are used by water birds, especially ae‘o (stilt) and maoli koloa, endangered species. Waterbirds also use the recently created lo‘i in the Makauwahi Cave Reserve.

Wetlands present throughout the Maha‘ulepu ahupua‘a must be fully mapped and tested during the EIS process to ensure against any degradation. Binding measures must be included to provide for regular monitoring of these sites after dairy production begins.

Springs

Waiopili Spring is a feature described by archaeologist Francis Ching as part of the cultural landscape that also included Waiopili Heiau and Kapunakea Pond. These sites were in or near the historic “Village of Maha‘ulepu,” some of which is located in the Makauwahi Cave Reserve. Waiopili Spring is located within the Old Maha‘ulepu Quarry, and it remains a continually flowing spring.

There are also springs in the nearshore ocean along the Maha‘ulepu coast and their presence may contribute to the abundance of edible seaweed along the coast.

Springs present throughout the Maha‘ulepu ahupua‘a must be fully mapped and tested during the EIS process to ensure against any degradation. Binding measures must be included to provide for regular monitoring of these sites after dairy production begins.

Time Frame

The model should forecast both short and long-term impacts of the dairy on the hydrological systems of Maha‘ulepu and Pa‘a. The potentially deleterious effects of the dairy could take years to manifest. However, substantial environmental degradation would have occurred even if the dairy were no longer in operation. If the hydrological study finds that long term or cumulative degradation of water sources and water features are at all possible, the study should recommend that HDF endow a perpetual environmental remediation and require HDF to reconsider site selection.

On-going Water Quality Monitoring

In addition to disclosing possible impacts, understanding the full hydrological systems and the potential short term, long term and cumulative impacts of the dairy on ground, subsurface stream, wetland and ocean waters of Maha‘ulepu and Pa‘a should result in development of a comprehensive, routine waters monitoring regime with public involvement and public disclosure.
Air Quality & Noise Concerns:

Air quality monitoring has not been included in HDF’s management plans and has been an unaddressed public concern since the dairy was posited. The Project site location is upwind and less than 2 miles from residential areas and commercial operations. There must be testing done to ensure against the drifting of effluent smell into Koloa-Poipu.

The effects of noise from the dairy operation, including trucks, farm machinery, and cows, has not been addressed by HDF to this point. The EIS must determine the extent, if any, that dairy-related noise will impact the surrounding communities.

Cultural Resources:

Maha‘ulepu is sacred and legendary to Native Hawaiians, many of whom are connected to this area by ancestral ties, burials in the dunes and valley, and by continuing cultural uses including fishing and gathering. There is a deep connection for many local families. Our kuleana has been restoration of the sites and of the practices that have been part of our vision.

For Hawaiians, the entire area is a spiritual sanctuary. Hawaiian cultural sites deserve the utmost respect and preservation, especially if they lie within or adjacent to the proposed dairy lands. From the base of Mount Ha'upu down to the beach, unmarked sites and burial grounds dot the landscape, as Hawaiians did not label grave sites. We do not know exact locations of many of these sites. The Draft EIS must show that these sites will not be ruined by including a thorough Archeological Impact Study and a subsequent Cultural Resources Preservation Plan in order to protect these resources.

On the coast, people have talked about gathering hinahiha for lei, as well as limu harvesting. But the primary cultural activity of the area is fishing. Generations of Kaua‘i residents have fished along the beaches, headlands and cliffs. Throw netting as well as pole fishing and diving occur.

The EIS should examine these traditional uses, speak with local practitioners and provide sufficient assurance that the Project will not affect their continuation.

Flora and Fauna:

Waterbirds, particularly stilt and koloa duck, are migratory and depend upon having multiple habitat areas available. In recent years, water birds used an intermittent wetland in Maha‘ulepu Valley as spring habitat. That area may have been altered in the past decade, but still koloa duck are seen now at the recently constructed lo‘i and historic fishpond area of the Makaawahi Cave Reserve as well as in shallow ponds in the Old Maha‘ulepu Quarry.

The Maha‘ulepu watershed has two units of habitat for endangered cave species. The Draft EIS should include possible impacts to the endemic Koloa Blind Wolf Cave spider and the blind cave amphipod. According to Dr. David Burney, there are other cave species of significance at the Makaawahi Cave Reserve.

Furthermore, the Makaawahi Cave Reserve itself is a highly important paleo-ecological and ecological research site, where the pH of the groundwater is critical to the preservation of fossils in the sediments of the cave. Bones of more than 45 species of birds and insects have been discovered here. Most of these are extinct or rare and several are new species. Makaawahi is a model for native plant restoration which is a long term goal for Maha‘ulepu.

These resources must be addressed in a full biodiversity study of all Maha‘ulepu ecosystems, as part of the Draft EIS.

Alternatives:

The list of alternatives provided in Hawaii Dairy Farms EIS preparation notice is too limited. A broader set of alternatives should be suggested and thoroughly examined.

The use of alternative technologies was not mentioned as an alternative to be studied. The use of effluent ponds and to treat wastewater and manure washed from the cow yard and milking shed can be replaced with a more accurately zero discharge system of recycling waste water, capturing methane for energy production. In such systems, Sludge from waste water systems can be converted to fertilizer rather than simply spread on specified dairy fields.

Previous expenditures for the planning and the equipment (including solar panels) for the dairy should not preclude consideration of these alternatives.

Given existing environmental conditions and alarmingly high bacteria counts in Maha‘ulepu streams, we expect the EIS to offer a thorough examination of the no-action alternative. Perhaps the carrying capacity of this area has already been reached, and additional intensive land uses will irreversibly contribute to the decline of environmental thresholds.

Another important alternative to study is the impacts of maintaining a smaller herd. It may be that the site cannot responsibly support the proposed 2000 cows. The amount of milk that several alternatives of smaller herds would produce has to be studied, including the longer period that the project would need to attain profitability.

Economic activity in Koloa-Poipu, indeed on Kauai, is tourism-based with Koloa-Poipu described as Kauai’s Waikiki. Maha‘ulepu contains the last undeveloped coast or stretch of beach.

Furthermore, the depth with which alternatives are explored will also be critical. For instance, will the alternative of moving the dairy, including locating it on land not owned by Grove Farm, Inc., be considered? Will “exchanging” land be considered, such as the tracts of land behind Hanamaulu or in the Kipu Valley? Will located the dairy on another island be considered? While
these alternatives might mean short-term monetary loses for HDF and perhaps Grove Farm, in the long term a more suitable site could be cost saving. The EIS needs to take into consideration other reasonable locations both on Kauai and elsewhere in Hawaii that meet HDF’s acreage and water access requirements.

Mitigation Measures:

Because Maha’ulepu is one of the last remaining open spaces on the south shore and is beloved by both residents and visitors, it is important that binding mitigation measures are included in the EIS. An environmental remediation bond, monitoring regimes with guaranteed community involvement or even a “good neighbor agreement” are examples of mitigative measures that could be binding and should be considered as components of the Draft EIS.

The Draft EIS must adequately ensure that all mitigation will be ongoing and will meet targeted requirements. The developer must have a plan to ensure they are met, with consequences if they are not.

Additional Issues:

The EIS should include an assessment of its compliance with the South Kauai Community Plan, which guides the future growth and physical development, protecting neighborhood character, creating new economic opportunity, and enhancing the quality of life for all who live, work, visit and invest in the area.

The EIS should identify what actions will be taken to determine the timing for herd growth. We expect to see a list of environmental indicators that must be met in order for the operation to expand to its eventual size of 2,000 cows.

The EIS must include plans for site remediation for when HDF ends operations. How will HDF guarantee that Maha’ulepu will be fully restored to its current condition? The operation includes buildings, holding ponds, gates and pens, raceways, piping, fencing, and other infrastructure. Will a remediation fund be set up to cover the cost of returning the site to its natural state?

Conclusion:

Maha’ulepu is important as a collection of natural resources, history, stories - with much more to discover - daily experiences and beauty. It is all of this together that make it a heritage place, one that demands our reverence. As advocates for this special place, we hope and expect a thorough examination of waste management, air and water quality protection, herd growth triggers, cultural considerations, alternative actions, and binding mitigation measures that require community involvement.

Community participation is key to developing a comprehensive EIS and we appreciate this opportunity to share our remarks. As a consulted party to this EIS process, we look forward to providing thoughtful review and scrutiny to the Draft EIS.

With Aloha,

Greg Peters
Executive Director
Malama Maha’ulepu
PO Box 1691
Koloa, Hawaii
96756
May 26, 2016

Greg Peters
Executive Director
Malama Māhāʻulepū
P.O. Box 1691
Kōloa HI 96756

Subject: Hawai‘i Dairy Farms Environmental Impact Statement (EIS)
Preparation Notice
Māhāʻulepū, Kōloa District, Kaua‘i, Hawai‘i
Response to Comments on EISP

Dear Mr. Peters:

Thank you for the input dated February 23, 2015 on the Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice (EISP). We acknowledge your comments about the project, and offer the following responses.

HDF seeks to establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhāʻulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as fertilizer for pasture grass to provide the primary source of nutrition. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will provide a local food source appropriate for cow health and quality milk production, and will initially comprise 70 percent of the animals’ diet.

As you are aware, Hawai‘i Dairy Farms (HDF) stepped forward in response to community concerns about the dairy for the Po‘ipū area and offered to prepare a comprehensive Environmental Impact Statement (EIS) for the proposed project. It is the purpose of Hawai‘i’s environmental law, known as HRS Chapter 343 and “HEPA”, to “establish a system of environmental review which will ensure that environmental concerns are given appropriate consideration in decision making along with economic and technical considerations.” The HEPA process includes scoping discussions with regulatory agencies and the community to identify issues of concern. HDF engaged technical consultants to analyze probable impacts on environmental and societal conditions. Relevant local, state and federal ordinances, statues, and regulations were considered. We believe the EIS demonstrates that this innovative dairy system will benefit the local and statewide community by advancing food sustainability.

HDF is committed to establishing a herd of up to 699 mature dairy cows, and demonstrating the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. The application process for a National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) permit includes public notification and input. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is currently estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

I. Water Quality

Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths - as great as 400 feet below sea level. Weathered lava in the area is typically saprolite, a soft, thoroughly decomposed rock. The Māhāʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.
The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed head size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaiʻi Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated head size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Poʻipu region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipu - Kalaeloa districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water:** The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hāʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopipi Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaching or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopipi Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococci to the State Department of Health (DOH) and provided its data, however; DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopipi Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.
Long-term Operations. Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDFS received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDFS will operate the paradigm practices of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35 feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be installed between the fences and drainageways to capture run-off strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā'ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDFS nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kāeo-Po'ipū region were also calculated. Nitrogen input to the marine environment in the Po'ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDFS. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDFS. The nutrient inputs from domestic uses in the Po'ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water exchange from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input to the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDFS site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality
monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

II. Air Quality and Noise

Air Quality

As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 milking cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4.19-2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 milking cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 milking cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.
GREENHOUSE GAS

Draft EIS Sections 4.19 and 4.26 address the potential for greenhouse gas emissions by Hawaii’s Dairy Farms (HDF). Estimates of GHG emission rates from a pasture-based dairy, including methane and nitrous oxide, were calculated using the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories. Parameters for oceanic dairy cattle in warm climates were selected as most applicable to conditions at HDF. Long-term operational impacts were modeled using the IPCC guidelines and conversions, and estimated the emissions potential for GHG at the dairy at the committed herd size of 699 milking cows to be 2,693 CO₂e metric tons per year. This equates to roughly 10 percent of the utility power generation sector on Kauai in 2013, which does not include vehicle emissions and other GHG emitters on the island.

Potential GHG emissions for HDF at the contemplated herd size of up to 2,000 milking cows was modeled as described in Section 4.19.3 using the IPCC guidelines and conversions. The estimated total of 7,702 CO₂e metric tons per year (8,490 tons) is 5,049 CO₂e metric tons (5,521 tons) greater than the committed herd size of 699 milking cows. This equates to an increase equivalent to 1.91 percent of GHG produced on Kauai for power generation by the utility in 2013 (KBIC, 2014). Power generation does not include vehicle emissions and other GHG emitters on the island.

While the presence of cows may increase GHG, a long-term beneficial impact of the grazing fields is the sequestration of carbon as CO₂ captured by the process of photosynthesis by the grass. According to recent studies in the Soil Science Society of America Journal, converting formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbon in soil, which enhances soil quality, grass production, and has the potential to offset up to one-third the annual increase in CO₂ production of an area.

Noise

Existing noise conditions of the project site and the surrounding Māhā‘ulepū valley area are evaluated in the Draft Environmental Impact Statement (EIS), along with anticipated short-term and long-term noise conditions associated with the dairy farm and planned mitigation actions. Draft EIS Section 4.12 addresses noise conditions.

Noise can be defined as unwanted sound, a sound that is considered loud or unpleasant, and/or sound that causes disturbance. Research related to noise and livestock focuses on noise levels and minimization of unexpected sounds that cause undue stress on cows. Noise stress results in loss of livestock productivity and thereby financial loss to farmers and ranchers. Little research exists on the sound levels from livestock.

Sound is measured in decibels (dB). The State of Hawaii Department of Health (DOH) rules use the A-weighting sound network (dba) in the HAR §11-46, Community Noise Control. Sound through the air is similar to ripples on a pond of water. In open space without reflection, ripples spread uniformly in all directions and decrease in amplitude further from the source. In free field conditions such as outdoor, amplitude drops by half as distance doubles (OSHA, 2016). When sound passes close to absorbing ground cover such as grassland and fields, the “soft ground” absorbs extra sound as it passes. The Hawai‘i Dairy Farms (HDF) site in Māhā‘ulepū Valley is approximately 2 miles from the resort area, and 1.5 miles from the closest residential areas (on land zoned for agriculture). Typical noise currently generated near the HDF site includes truck ingress/egress along private farm roads, agricultural equipment, and cattle and sheep.

Construction work at the project site will involve activities that may generate an increase in noise levels. However, such exposures will be a short-term condition, occurring during daylight hours. Construction vehicles and activities must comply with DOH Administrative Rules. DOH noise control regulation requires a permit for construction activities that emit noise in excess of 78 decibels or that cause a total of more than $250,000. Mitigation measures to minimize construction noise will include the use of mufflers to suppress loud equipment and limitations on the hours of heavy equipment operation.

The dairy farm will utilize milking equipment contained in the milking parlor, and will use field equipment such as tractors. Under HAR §11-46, agriculture is classified as Zoning District Class C, which specifies maximum permissible sound levels of 70 dBA in the daytime and 70 dBA at nighttime. Dairy operations will generate noise in keeping with agricultural zoning of the parcel. The primary noise receptors in the area would be farmers working nearby parcels. Noise from the dairy will not exceed the DOH threshold, and will not contribute to excessive noise in the region.

III. CULTURAL RESOURCES

The Hawaii Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-286. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-10-309, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.
That a majority of the documented sites are related to the historic era is not surprising, given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic era cultural materials associated with the many Land Commission Awards in the project area were non-existent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, and occur outside the project area on lands owned by a different landowner; both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources practices or beliefs, its potential to isolate cultural resources practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhā‘ulepū Ahupua‘a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

IV. Flora and Fauna

Waterbirds

Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the property. EIS Sections 4.9 and 4.11 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing plant species. The survey also investigated the presence of plants currently listed as endangered, threatened or proposed for listing under Federal or the State of Hawai‘is endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plants species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhā‘ulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kauai may overfly the site. The endangered Hawaiian goose, nēnē was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kōloa area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to project-specifed areas, marking tall structures and fencing with white visibility polytape, limiting nighttime lighting, and shading any outside lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

CAVE AND LAVA TUBE INVERTEBRATES

A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā‘ulepū area, as well as the parasites and predators on site that control those species. Fieldwork was conducted during September 15-16, 2014. The entire study is included in Draft Environmental Impact Statement (EIS) as Appendix B.
There are no known caves or lava tubes found at or adjacent to the dairy farm property. The Kīōao Lava Tube System, which provides habitat for two endemic cave species, the Kīōao Cave Wolf Spider and the Kīōao Cave amphipod, is located several miles away from the dairy farm property. Both invertebrates are listed as endangered under the U.S. Endangered Species Act. Not all caves in the Kīōao area contain those invertebrates, as many do not contain the optimal climatological conditions required by these organisms. Neither the botanical and faunal survey nor the invertebrate survey revealed any evidence of lava tubes or caves on the property, and no such features have been reported for the area near the Hawai‘i Dairy Farms (HDF) site. Thus no cave invertebrate species will be affected by the dairy farm.

V. Alternatives
As a part of the DES, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project.

Four possible land uses that would not meet the project purpose were discussed. Renozoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose. The Agricultural Park alternative does not fulfill the need for a new agricultural model, and does not provide a critical source of nutrition for the people of Hawai‘i that is vulnerable to supply disruptive. The Agricultural Subdivision alternative does not meet the purpose and need of the proposed action, as it does not provide support for a unique underrepresented industry like dairy which is overly imported in the state of Hawai‘i.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location, and (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i. The alternative of “No Action” is also evaluated. One additional alternative was evaluated, considering a scenario for processing the dairy products at an Off-Island Facility.

Although the alternative approaches are potentially reasonable uses under existing zoning and neighboring uses, they each fail to comprehensively fulfill the requirements defined with the five established Evaluation Criteria (IV). The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State's fresh milk demand, reducing dependence on imported milk (Criterion 1). This alternative, however, would not be pasture-based and could negatively affect air and water quality.

- None of the alternatives would include a dairy location that meets the requirements of a pastoral, rotational-grazing dairy minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy, soils science, livestock management, environmental resources management (Criterion 2). However, the purpose and need to provide fresh fluid milk would only be met with the Conventional Feedlot Dairy Alternative.

- The alternative for Agricultural Park could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems, and support facilities. (Criterion 3). After many years, Grove Farm encountered limited interest in such a venture.

- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Criterion 5) the four alternative scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast, the planned agricultural operations of Hawai‘i Dairy Farm, were determined after substantial analysis to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the five Evaluation Criteria (Section 2.3.4). Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

- The planned dairy location that meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
VI. Additional Issues

South Kaua‘i Community Plan

The County of Kaua‘i’s South Kaua‘i Community Plan serves to guide development in the southern Kōloa-Po‘ipū-Kaliihe‘u-‘Oma‘o-Lawai region of Kaua‘i, and the policies are reflected in the Community Plan Land Use Map, see Draft EIS Section 5, Figure 5-14.1. Watersheds will be protected through sustainable practices in accordance with county, state, and federal guidelines, cultural resources will be identified and protected per HRS Chapter 6E Historic Preservation requirements. The agricultural use of the dairy project is consistent with the agricultural designation per the South Kaua‘i Community Plan Land Use Map, and will continue Kaua‘i’s longstanding policy of preserving agricultural lands as a valuable resource base.

Conclusion

The proposed dairy farm will achieve the objective of increasing current local milk production and bolstering Hawai‘i’s declining dairy industry while reducing reliance on imported milk from the mainland United States. The rotational-grazing pasture system will utilize manure on-site as fertilizer to grow grass, reducing imported fertilizer and feed, and minimizing potential impacts to the environment. The dairy farm will comply with all applicable federal, state, and county policies in plans in regards to land use, environmental protection measures, and other associated regulatory controls.
February 22, 2015

By e-mail: (originals by registered mail) laura.mcintyre@doh.hawaii.gov
HDF@Group70int.com

Laura McIntyre
State of Hawaii
Department of Health
1250 Punchbowl Street
Honolulu, HI 96813

Group 70 International, Inc.
825 Bethel Street, 5th Floor
Honolulu, HI 96813

Jeff Overton
Hawai'i Dairy Farms, LLC
PO Box 1690
Koloa, HI 96756-1690

Dear Ms. McIntyre:

RE: THE ASSOCIATION OF APARTMENT OWNERS OF POIPU CRATER COMMENTS ON HAWAII DAIRY FARM'S ENVIRONMENTAL IMPACT STATEMENT (EIS) PREPARATION NOTICE OF JANUARY 2015

The Association of Apartment Owners of Poipu Crater ("PC") represents a 7 acre resort development of 30 condominium units located in Poipu, Hawai'i, in close proximity to the site of the large commercial dairy being proposed by Hawai'i Dairy Farms ("HDF").

Several of our owners are full-time residents of Hawai'i, while others are from the mainland (USA & Canada) and elsewhere. Some of the owners live in areas with commercial cattle operations (feed lots and farms) and have witnessed first-hand the destructive impacts of such operations, not only on the grounds of these operations but also on the surrounding environment and any nearby communities. The impacts are a certainty; not a question of "if" but rather "to what extent" such operations affect their surroundings. Understandably, we are deeply concerned about the impacts HDF’s proposed dairy would have on Poipu, and specifically on our resort.

We therefore respectfully submit that HDF must provide factual answers in the EIS, based on science and not mere rhetoric, to our serious concerns that:

1) The Dairy would pollute the Maha‘ulepu coast.

Note: PC owners and their guests use and tremendously enjoy the beauty of the coastline at Maha‘ulepu. However, crossing Waiopilli stream (by Gillin’s beach) is already worrisome as the stream discharge looks awful, and we are aware of reports (by Surfrider) that it is by far the most polluted stream in Kauai, with dangerously high bacteria counts. It would defy logic that runoff from a large commercial dairy operation upstream would not further exacerbate the problem at Waiopilli stream and at other discharge points along the coast.

2) The Dairy would pose a public health risk and diminish the quality of life at our resort due to:
   a) pollution of wells feeding our drinking water supply;
   b) proliferation of pests such as mosquitoes, biting flies and rats; and,
   c) reduced air quality, with prevailing winds carrying noxious odours and gasses to Poipu and our resort.

Note: PC owners have experienced the stench and insects when approaching existing cattle operations from miles away, especially when downwind. The smell is nauseous and needs to be washed out of clothing. We do not wish to endure this at PC; and certainly tourists would not. By what miracle will HDF’s Dairy be any different than all these other cattle operations?

   It is also troublesome that the HDF Dairy is apparently based on a flawed New Zealand model which has caused significant and documented environmental problems.

3) The Dairy would have a negative economic impact by hurting Poipu’s tourism industry, striking our property values and vacation rental incomes.

Note: If concerns 1) and 2) above are realized, then surely the economic welfare of Poipu and our resort would be severely impacted. Negative reviews and warnings on social media would repel tourism to other parts of Kauai, or to other vacation destinations altogether. Poipu would be put into economic distress.

Our concerns are legitimate and serious, and need to be directly addressed and answered by the EIS. If facts and science do not clearly dispel these concerns, then this Diary must not be permitted.

Regards,

John Ferrante,
President, Poipu Crater AAAC
May 26, 2016  

John Ferrante  
President  
Po'ipu Crater AOAO  
2310 Ho'ohu Road  
Koloa HI 96756

Subject: Hawai'i Dairy Farms Environmental Impact Statement (EIS)  
Preparation Notice  
Māhā'ulepū, Kōloa District, Kaua‘i, Hawai‘i

Response to Comments on EISPN

Dear Mr. Ferrante:

Thank you for the input dated February 22, 2015 on the Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice (EISPN). We acknowledge your comments about the project, and offer the following responses.

HDF seeks to establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā'ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawaii families. The rotational-grazing method utilizes 100 percent of the cows’ manure as fertilizer for pasture grass to provide the primary source of nutrition. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will provide a local food source appropriate for cow health and quality milk production, and will initially comprise 70 percent of the animals’ diet.

As you are aware, Hawai‘i Dairy Farms (HDF) stepped forward in response to community concerns about the dairy for the Po'ipu area and offered to prepare a comprehensive Environmental Impact Statement (EIS) for the proposed project. It is the purpose of Hawaii’s environmental law, known as HRS Chapter 343 and “HEPA,” to establish a system of environmental review which will ensure that environmental concerns are given appropriate consideration in decision making along with economic and technical considerations. “The HEPA process includes scoping discussions with regulatory agencies and the community to identify issues of concern. HDF engaged technical consultants to analyze probable impacts on environmental and societal conditions. Relevant local, state and federal ordinances, statutes, and regulations were considered. We believe the EIS demonstrates that this innovative dairy system will benefit the local and statewide community by advancing food sustainability.

HDF is committed to establishing a herd of up to 699 mature dairy cows, and demonstrating the pasture-based system as an economically and environmentally sustainable model for Hawaii. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. The application process for a National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) permit includes public notification and input. At the discretion of HDF, management may choose to expand operations beyond the carrying capacity of the land, which is currently estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

I. Nearshore Marine Water Contamination

An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc (MRCI). Surface water from the Waioli Poi Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment and the marine environment. The nearshore area is a highly mixed environment.

As you are aware, Hāwai‘i Dairy Farms (HDF) stepped forward in response to community concerns about the dairy for the Po'ipu area and offered to prepare a comprehensive Environmental Impact Statement (EIS) for the proposed project. It is the purpose of Hawaii’s environmental law, known as HRS Chapter 343 and “HEPA,” to establish a system of environmental review which will ensure that environmental concerns are given appropriate consideration in decision making along with economic and technical considerations. “The HEPA process includes scoping discussions with regulatory agencies and the community to identify issues of concern. HDF engaged technical consultants to analyze probable impacts on environmental and societal conditions. Relevant local, state and federal ordinances, statutes, and regulations were considered. We believe the EIS demonstrates that this innovative dairy system will benefit the local and statewide community by advancing food sustainability.

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The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment.
location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

Hydrology: The area’s hydrology is shaped by its geology. The Kōkua area was built on Nāpali Formation lavas of the Waimanu volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōkua series. The alluvial material is highly weathered lava and is comprised of dark brown to black sily day and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōkua-Pōpū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results of these studies demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaii Department of Health Milk Rules require that potable water be used for milk production, both for milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāulepū 14 well and the County's Kōkua F well will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāulepū Valley, HDF established a 1,000-foot setback surrounding the Kōkua F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to and, during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Pests: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhāulepū area, as well as the pansites and predators that control these species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila musaphilia, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-‘ohi‘a forests.
Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhā‘ulepū Valley will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung patties in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōloa-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ala Kāna‘i Road between Kōloa and Po‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animals wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

Air Quality – Odor
Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity/mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 milking cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 milking cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

III. Economic Impacts
The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to ongoing dairy operations would be created on O‘ahu.
HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

Conclusion
The proposed dairy farm will achieve the objective of increasing current local milk production and bolstering Hawai‘i’s declining dairy industry while reducing reliance on imported milk from the mainland United States. The rotational-grazing dairy system will utilize manure on-site as fertilizer to grow grass, reducing imported fertilizer and feed, and minimizing potential impacts to the environment. The dairy farm will comply with all applicable federal, state, and county policies in plans in regards to land use, environmental protection measures, and other associated regulatory controls.
Good Evening Ms. McIntyre and Mr. Overton,

Please accept the attached document, provided in pdf format, as the Sierra Club's public comment for the HDF EIS Preparation Notice.

Mahalo,

Greg Peters

gregpeters@sierraclub.org

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Greg Peters
on behalf of the Kaua`i Group Executive Committee

Laura McIntyre
State of Hawaii, Department of Health
Environmental Planning Office
919 Ala Moana Blvd., Room 3132
Honolulu, HI 96814
epo@doh.hawaii.gov

Jeff Overton
Group 70 International
925 Bethel St., 5th Floor
Honolulu, HI 96813
HF@Group70int.com

Submitted via E-mail to all parties.

RE: Notice of Preparation of Draft Environmental Impact Statement (EIS) for Hawaii Dairy Farms’ Proposed Dairy, Maha‘ulepu, Kauai

Aloha Ms. McIntyre and Mr. Overton,

The Kaua`i Group of the Sierra Club of Hawai`i appreciate the opportunity to comment on the EIS Preparation Notice for Hawaii Dairy Farms’ proposed dairy operation.

As part of America’s oldest, largest and most influential grassroots environmental organization, the Sierra Club Hawaii Chapter has a kuleana to provide scrutiny to any proposed land uses that could pose harm to the island’s natural resources. In our review of the proposal we have found causes of grave concern that the placement of a dairy in the culturally and environmentally sensitive Maha‘ulepu Valley will have disastrous effects on Kauai’s environment.

With more than 150,000 pounds of manure being produced every month with multiple county water wells in close proximity, there are serious health hazards and environmental risks threatening Maha‘ulepu’s beautiful, ecologically unique, and culturally significant coastline. The multiple iterations of HDF’s operations and waste management plans have provided neither sound planning nor wise resource utilization and were based on incorrect information and untested assumptions.

Water Quality Protection

- We expect an extensive hydrological study to be completed for the entire Maha‘ulepu watershed to establish ground and surface water flows. The study must describe in detail how cow effluent will not contaminate water resources while remaining entirely on site.
- Explain in more detail the drainage improvements, which may include drain lines, grass swales, and culverts to balance any expected increases in runoff resulting from the proposed project.
- Describe in detail how the discovery of any nonpoint source pollution of valley water will be managed.

Sierra Club of Hawai’i, Kauai Group | PO Box 3412, Lihue, Hawaii 96766 | hi.sierraclub.org

Emailed correspondence reduces paper waste. If you do print this letter, please recycle. Mahalo.
Please describe in detail any specific mitigation measures to address erosion and flash flood hazards in the Maha`ulepu Valley.

Please describe in detail potential impacts to the community’s drinking water from effluent run off and the response plan for addressing public health dangers.

Potential indirect and cumulative impacts of the dairy on ground, subsurface stream, wetland and ocean waters of Maha`ulepu should result in development of a comprehensive, routine waters monitoring regime with public involvement and public disclosure.

Herd Management
Identify what actions will be taken to determine the timing for herd growth. We expect to see a list of environmental indicators that must be met in order for the operation to expand.

Air Quality and Noise Concerns
Air quality monitoring has not been included in HDF’s management plans and has been an unaddressed public concern since the dairy was posited. The Project site location is upwind and less than 2 miles from residential areas and commercial operations. There must be testing done to ensure against the drifting of effluent smell into Poipu-Koloa.

Cultural Concerns
The Draft EIS must show that the many unmarked cultural sites in Maha`ulepu Valley will not be ruined by including a thorough Archeological Impact Study. The EIS should examine traditional Hawaiian uses of the land and provide sufficient assurance that the Project will not affect their continuation.

Alternative Actions
A thorough set of alternative actions must be examined, that include alternative site selection both on-island and off-island, smaller herd sizes, and no-action.

Mitigation Measures
Meaningful mitigation measures must be included in the EIS in order to provide greater transparency in the operation and provide the community with assurance that any environmental damage can be addressed immediately. Examples include mandated community involvement in environmental monitoring, the issuance of an environmental remediation bond, or joint fact finding in the event of potential damage.

We believe that a thorough and impartial EIS process is the only means to provide reasonable certainty that the project will not negatively impact Maha`ulepu’s land, waters, and neighboring communities. Thank you for your consideration of our comments. We look forward to being a consulted party for review of the Draft EIS.

Aloha,

Greg Peters
on behalf of the Kaua`i Group Executive Committee

Hawaii Chapter of the Sierra Club
Kauai Group
PO Box 3472
Lihue, Hawaii
96766
May 26, 2016

Greg Peters
on behalf of
The Kaua'i Group Executive Committee
Hawai'i Chapter of the Sierra Club
Kaua'i Group
P.O. Box 3412
Lihue, HI 96766

Subject: Hawai'i Dairy Farms Environmental Impact Statement (EIS)
Preparation Notice
Māhā'ulepū, Kōloa District, Kaua'i, Hawai'i
Response to Comments on EBPN

Dear Mr. Peters:

Thank you for the input dated February 23, 2015 on the Hawai'i Dairy Farms Environmental Impact Statement Preparation Notice (EBPN). We acknowledge your comments about the project, and offer the following responses.

HDF seeks to establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā'ulepū Valley on the island of Kaua'i to produce fresh, locally available nutritious milk for Hawai'i families. The rotational-grazing method utilizes 100 percent of the cows' manure as fertilizer for pasture grass to provide the primary source of nutrition. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will provide a local food source appropriate for cow health and quality milk production, and will initially comprise 70 percent of the animals' diet.

As you are aware, Hawai'i Dairy Farms (HDF) stepped forward in response to community concerns about the dairy for the Po'iipū area and offered to prepare a comprehensive Environmental Impact Statement (EIS) for the proposed project. It is the purpose of Hawai'i's environmental law, known as HRS Chapter 343 and "HEPA", to "establish a system of environmental review which will ensure that environmental concerns are given appropriate consideration in decision making along with economic and technical considerations." The HEPA process includes scoping discussions with regulatory agencies and the community to identify issues of concern. HDF engaged technical consultants to analyze probable impacts on environmental and societal conditions. Relevant local, state and federal ordinances, statutes, and regulations were considered. We believe the EIS demonstrates that this innovative dairy system will benefit the local and statewide community by advancing food sustainability.

HDF is committed to establishing a herd of up to 699 mature dairy cows, and demonstrating the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. The application process for a National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) permit includes public notification and input. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is currently estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

Water Quality Protection
Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The groundwater and surface water analysis conducted for this Draft EIS identified an aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blankets the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā'ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po'ipū region is on the order of 0.1 – 0.001 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.
The groundwater and surface water analysis for this Draft EIS examined whether encompass 19.2 percent of the County population. For the South Kaua‘i region, the increase of nearly 1 million gallons per day is projected to be 3.2 GPD, an increase of nearly 1 million gallons per day in项目 growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well drinking water. Should HDF decide, in the future, to expand to the contemplated high stream discharge. There are no perennial streams in the Mulep valley that originate at a small unnamed spring and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest water demand from the dairy operation, and the 4,500-foot distance between the Mala‘alo Valley and the HDF site, are not affecting the water supply in the area. The well pumping in the area will not impact the drinking water well.

Though the water body in which the County wells occur is confined and hydraulically recharged from shallow groundwater in the Mala‘alo Valley, the site, the Kaua‘i Fish and Wildlife Department, established a 1,000-foot setback surrounding the Kaua‘i Fish and Wildlife Department’s jurisdiction. Groundwater in the shallow portion of the alluvium will not impact the County drinking water well. The assessment concludes that the modest water demand from the dairy operation, and the 4,500-foot distance between the Mala‘alo Valley and the HDF site, are not affecting the water supply in the area. The well pumping in the area will not impact the drinking water well.
Complaints from the public citing the high levels of Enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CBW to conduct a "Sanitary Survey" of the Māhāulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and a area upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CBW noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Library" (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to capture other strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.2.3 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kūkua-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually from existing agricultural ditches down gradient to nutrients sampled in the nearshore ocean water. The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downstream to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality
monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua'i community.

**Herd Management**
The milk production cycle of a cow begins after birth of a calf, when lactation begins. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua'i to be raised offsite. The permitted herd size of 699 mature dairy cows at the Māhāʻulepū site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other ranches as needed for animal health and dairy productivity. This will both benefit the dairy, and infuse the beef market in Hawaii with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (female calves that haven’t given birth) will be raised until returned to the HDF herd as a birthing/milking cow.

Two ranches on Kaua'i have initially expressed an interest in taking HDF calves and heifers. Makoa Ranch near Kapaa is an active cattle ranch run by the Farias family. The ranch will care for dry cows during an annual resting period, and raise calves until ready for return to HDF pasture. Calves suitable as beef cattle will be raised until returned to HDF as a birthing/milking cow.

The ranch will care for dry cows during an annual resting period, and raise calves until ready for return to HDF pasture. Calves suitable as beef cattle will be incorporated into the Makoa Ranch herd or sold to other ranching operations. “Close-up cows”, or those cows returning to milk production at HDF will initially be transferred to 'Oma'o Ranch for transition.

Annually, dairy cows are rested or “dried” for 60 days before returning to milk production. The existing ranch operations are established and require no additional facilities, permits, or improvements to have fluctuation in herd numbers, which is typical of cattle operations.

**Air Quality**
As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

**ODOR**
Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of the panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 milking cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 milking cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

**Noise**
Existing noise conditions of the project site and the surrounding Māhāʻulepū valley area are evaluated in the Draft Environmental Impact Statement (EIS), along with anticipated short-term and long-term noise conditions associated with the dairy farm and planned mitigation actions. Draft EIS Section 4.12 addresses noise conditions.

Noise can be defined as unwanted sound, a sound that is considered loud or unpleasant, and/or sound that causes disturbance. Research related to noise and livestock focuses on noise levels and minimization of unexpected sounds that cause undue stress on cows. Noise stress results in loss of livestock productivity and thereby financial loss to farmers and ranchers. Little research exists on the sound levels from livestock.
Sound is measured in decibels (dB). The State of Hawai'i Department of Health (DOH) rules use the A-weighting sound network (dBA) in the HAR §11-46, Community Noise Control. Sound through the air is similar to ripples on a pond of water. In open space without reflection, ripples spread uniformly in all directions and decrease in amplitude further from the source. In free field conditions such as outdoors, amplitude drops by half as distance doubles (OSHA, 2016). When sound passes close to absorbing ground cover such as grassland and fields, the "soft ground" absorbs extra sound as it passes. The Hawai'i Dairy Farms (HDF) site in Māhāulepū Valley is approximately 2 miles from the resort area, and 1.5 miles from the closest residential areas (on land zoned for agriculture). Typical noise currently generated near the HDF site includes truck ingress/egress along private farm roads, agricultural equipment, and cattle and sheep.

Construction work at the project site will involve activities that may generate an increase in noise levels. However, such exposures will be a short-term condition, occurring during daylight hours. Construction vehicles and activities must comply with DOH Administrative Rules. DOH noise control regulation requires a permit for construction activities that emit noise in excess of 78 decibels or that cost a total of more than $250,000. Mitigation measures to minimize construction noise will include the use of mufflers to suppress loud equipment and limitations on the hours of heavy equipment operation.

The dairy farm will utilize milking equipment contained in the milking parlor, and will use field equipment such as tractors. Under HAR §11-46, agriculture is classified as Zoning District Class C, which specifies maximum permissible sound levels of 70 dBA in the daytime and 70 dBA at nighttime. Dairy operations will generate noise in keeping with agricultural zoning of the parcel. The primary noise receptors in the area would be farmers working nearby parcels. Noise from the dairy will not exceed the DOH threshold, and will not contribute to excessive noise in the region.

Cultural Concerns

The Hawai'i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic-era cultural materials associated with the many Land Commission Awards in the project area were non-existent, as explored through survey and subsurface exploration.

The six historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhāulepū Ahupua'a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully endorsed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

Alternative Actions

As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action's purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai'i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could
attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements:

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).

- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.

- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).
Conclusion

The proposed dairy farm will achieve the objective of increasing current local milk production and bolstering Hawaii's declining dairy industry while reducing reliance on imported milk from the mainland United States. The rotational-grazing dairy system will utilize manure on-site as fertilizer to grow grass, reducing imported fertilizer and feed, and minimizing potential impacts to the environment. The dairy farm will comply with all applicable federal, state, and county policies in plans in regards to land use, environmental protection measures, and other associated regulatory controls.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaii Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

cc: Hawaii Dairy Farms
Hawaii State Department of Health,
Environmental Planning Office
Surfrider’s Blue Water Task Force has been monitoring the concentrations of fecal indicator Enterococcus bacteria in Waiopili Stream, which receives water from the drainage ditches of HDF and empties into the ocean at Mauaulepua near what is locally known as Gillin’s Beach. In addition, Surfrider has been measuring nutrient concentrations (Total Nitrogen, Ammonium Nitrogen, Nitrate + Nitrite, Phosphorus), total suspended solids, and turbidity in those stream waters. These data were provided to the Hawaii Department of Health (DOH) and the DOH collected and analyzed its own additional samples. The geometric mean values for the results of analysis of samples collected by Surfrider between March 7, 2014 and February 7, 2015 far exceeded Hawaii State Standards and qualify the stream and the receiving beach waters as polluted (Table 1).

<table>
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<th>Waiopili Stream</th>
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<td>Nitrate + Nitrite Nitrogen</td>
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<table>
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<th>Gillin’s Beach</th>
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Surfrider has expressed to the DOH that an NPDES permit is required of HDF as the stream and ocean are already chronically polluted. HDF apparently applied and then withdrew its application for a NPDES permit while continuing activities on its property that added to the pollution.

HDF needs to correct the water quality impairments that exist from current on-site activities before the State even consider allowing a large-scale project to proceed. Once the site has been remediated and pollution sources addressed, then HDF will need to prove through the EIS study that additional activities will not add any further significant environmental impacts.

Of specific concern are the following criteria for the EIS preparation notice:

### Criteria #2: Curtails the range of beneficial uses of the environment (for plants, animals, or humans).

Stream, estuarine, and coastal waters polluted with pathogens curtail the recreational use of those waters by humans and their pets by increasing the probability of getting infected while in the waters. The presence of pathogens also curtails traditional cultural practices, subsistence fishing, and subsistence harvesting of seaweed in the Mauaulepua area, as ingestion of the food could also cause infections. Surfrider and DOH data indicate extremely high concentrations of fecal indicator bacteria (Enterococcus and Clostridiun) in Waiopili stream and coastal waters at Mauaulepua. This is against the Federal Clean Water Act and Hawaii Revised Statutes. Whether these bacteria originate from humans or animals is irrelevant, as pathogens are associated with animal fecal material. The documented presence of fecal indicating bacteria before the large herd of HDF cows are even on the land, points out the inevitability of fecal contamination by run-off from the HDF. The HDF claim of “zero discharge” has already been shown to be false. Compact clay soil, huge amounts of manure and urine, and rainfall will undoubtedly cause run-off to HDF ditches which are designed to discharge into Waiopili stream and thus the ocean. Pathogens in the water seriously curtails the range of beneficial uses of Mauaulepua for humans and animals.

### Criteria #3: Substantially affects public health.

The documented presence of fecal indicating bacteria and the DNA analysis of Bacteroidales, proves there is a public health risk in waters of Waiopili stream and the ocean where it enters. These indicators were found in the ditch drainage system of HDF even before cows were brought on to the property and feral and domestic animal concentrations were low. With 2000 cows there contaminating the soils with feces and urine, run-off into the Waiopili stream is inevitable. People and their pets that are in the public recreational waters of Waiopili stream and the ocean are at high risk of infection. There is one documented case of such infection. HDF must prove that there will never be discharge from direct surface run-off or ditch discharge into Waiopili stream. The waters are already polluted under standards set in Hawaii Administrative Rules Chapter 11-54 and must not be polluted further.

Perhaps of greater importance is the potential for contamination of Kauai County public drinking water wells and a private drinking water well near the HDF. Contamination of these wells by pathogens indicates that, and phosphates is likely as the cows’ urine and manure is deposited directly on the fields and waste water collected in basins is sprayed on the fields. There are also concerns about the possible contamination of the well water by hormones and antibiotics that are in the feed or are given directly to the cows. HDF must prove that their waste management system will not cause any contamination of shallow or deep drinking water wells.

### Criteria #7: Involves a substantial degradation of environmental quality.

The data provided in Table 1 above, along with the data from DOH, proves that the HDF and adjacent agricultural and industrial activities have polluted state waters above Hawaii State Criteria for fecal indicating bacteria, nutrients, turbidity and total suspended solids. The ocean at Gillin’s beach is polluted for fecal indicating bacteria coming from stream waters. The waters are already polluted and under state law, must not be polluted further. HDF must prove that there will never be discharge from direct surface run-off or ditch discharge into Waiopili stream.

Surfrider tests of shallow groundwater in the Gillin’s Beach area shows that it too is polluted with nutrients. Through submarine groundwater discharge this contaminated water pollutes nearshore waters. With the addition of 2000 cows to HDF, percolation of nutrients (mainly nitrogen and phosphorus compounds) into the shallow groundwater and migration into
nearshore waters is inevitable. This is predicated to cause nutrientization of these waters and ecological changes to the algal and coral communities.

Application of pesticides for weed control may contaminate water and mud in Waipoipili Stream and thus affect environmental quality. Preliminary tests of the stream suggest that glyphosate may already be present at very low concentrations. More thorough baseline testing is planned by HDF and the results may express further concerns for environmental quality of stream and nearshore waters that must be addressed in the EIS.

Antibiotics used in animal feed and through direct injection of cows are of great environmental concern, both as how they affect stream and nearshore ecosystem ecology and how they might foster the evolution of antibiotic resistant strains of pathogenic bacteria. These would enter the environment where cows were contaminating the soils with their feces and urine and this then entered other surface waters by runoff or groundwater by percolation. The impounding of animal wastes and then spraying them on to the fields might further the contamination of the environment.

Hormones used in dairy operations are also of environmental concern as they might alter normal reproductive physiology of stream and marine organisms, thus changing the basic ecology of the stream, estuarine and nearshore ocean ecosystems.

HDF must prove that there will never be discharge of pollutants from direct surface runoff or ditch discharge into Waipoipili stream, and that percolation into both shallow and deep groundwater will not contaminate stream, estuarine and coastal waters.

Criteria #1. Is individually limited but cumulatively has considerable affect upon the environment or involves a commitment for larger actions.

HDF leases and manages the largest tract of land in lower Mahalepu valley, but there are other agricultural leases producing taro, corn, cattle and other crops in the same drainage basin. In addition, there is an industrial quarry operation in the area. Collectively and cumulatively they have significantly impacted the water quality of the area as expressed in the water quality of Waipoipili stream, the shallow groundwater near the beach, and the ocean. Of obvious concern with agricultural operations is the application of additional amounts of nutrients, whether from animal wastes or commercial fertilizer, and increased soil runoff. Unique to the HDF operations will be the addition of antibiotics and hormones into the environment. HDF needs to address how the addition of 2000 cows will increase the already polluting cumulative impact of the leased area on its waters.

Criteria #10. Detrimentally affects water quality.

The data provided in Table 1 above, along with the data from DOH, proves that the HDF and adjacent agricultural and industrial activities have polluted state waters above Hawaii State Criteria for fecal indicating bacteria, nutrients, turbidity and total suspended solids. The ocean at Gillim’s beach is polluted for fecal indicating bacteria coming from stream waters. The waters are already polluted and under state law, must not be polluted further. HDF must prove that there will never be discharge from direct surface runoff or ditch discharge into Waipoipili stream.

Surge tests of shallow groundwater in the Gillim’s Beach area shows that it too is polluted with nutrients. Through submarine groundwater discharge this contaminated water pollutes nearshore waters. With the addition of 2000 cows to HDF, percolation of nutrients (mainly nitrogen and phosphorous compounds) into the shallow groundwater and migration into
Dear Dr. Berg:

Thank you for the input dated February 20, 2015 on the Hawai’i Dairy Farms Environmental Impact Statement Preparation Notice (EISPN). We acknowledge your comments about the project, and offer the following responses.

HDF seeks to establish and operate a sustainable, pastoral rotational-grazing dairy farm in Mānālani Valley on the island of Kaua’i to produce fresh, locally available nutritious milk for Hawai’i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as fertilizer for pasture grass to provide the primary source of nutrition. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will provide a local food source appropriate for cow health and quality milk production, and will initially comprise 70 percent of the animals’ diet.

As you are aware, Hawai’i Dairy Farms (HDF) stepped forward in response to community concerns about the dairy for the Pāipā area and offered to prepare a comprehensive Environmental Impact Statement (EIS) for the proposed project. It is the purpose of Hawai’i’s environmental law, known as HRS Chapter 343 and “HEPA,” to “establish a system of environmental review which will ensure that environmental concerns are given appropriate consideration in decision making along with economic and technical considerations.” The HEPA process includes scoping discussions with regulatory agencies and the community to identify issues of concern. HDF engaged technical consultants to analyze probable impacts on environmental and societal conditions. Relevant local, state and federal ordinances, statutes, and regulations were considered. We believe the EIS demonstrates that this innovative dairy system will benefit the local and statewide community by advancing food sustainability.

HDF is committed to establishing a herd of up to 699 mature dairy cows, and demonstrating the pasture-based system as an economically and environmentally sustainable model for Hawai’i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help
determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. The application process for a National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) permit includes public notification and input. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is currently estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

1. Stream Contamination

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.
II. Ground Water and Hydrology

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Wainee volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Sapolilite, a soft, thoroughly decomposed rock. The Māhāʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the aquifer that underlies Māhāʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material is hydrologically connected to the deep aquifer formed in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further details.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable drinking water quality water from groundwater provided through an on-site well. The State of Hawai’i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

III. Endangered Species

Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AEOS Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened or proposed for listing under Federal or the State of Hawai’i’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural...
botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plants species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhāʻulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kauai may overfly the site. The endangered Hawaiian goose, nēnē was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kōloa area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to project-specified areas, marking tall structures and fencing with white visibility polytape, limiting nighttime lighting and shading any outside lights used at night. Ongoing mitigation strategies will be implemented. Potential preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable host trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

Conclusion

The proposed dairy farm will achieve the objective of increasing current local milk production and bolstering Hawaii’s declining dairy industry while reducing reliance on imported milk from the mainland United States. The rotational-grazing dairy system will utilize manure on-site as fertilizer to grow grass, reducing imported fertilizer and feed, and minimizing potential impacts to the environment. The dairy farm will comply with all applicable federal, state, and county policies in plans in regards to land use, environmental protection measures, and other associated regulatory controls.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawaii Dairy Farms”: http://tinyurl.com/OEQCOKAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

cc:  Hawaii Dairy Farms
     Hawaii State Department of Health,
     Environmental Planning Office
Hard copy via U.S. mail.

Cynthia R. Larsen-Dias
Assistant to Lisa Woods Munger, Lisa A. Bail and Christine A. Terada
Goodsill Anderson Quinn & Stifel
A LIMITED LIABILITY LAW PARTNERSHIP LLP
First Hawaiian Center / Suite 1600 / 999 Bishop Street / Honolulu, Hawaii 96813
P. (808) 547-5745
E. clarsendias@goodsill.com
www.goodsill.com

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February 23, 2015

HAND DELIVERY AND U.S. MAIL

Laura McIntyre
Environmental Planning Office
Hawai‘i State Department of Health
1250 Punchbowl Street
Honolulu, Hawai‘i 96813

Jeff Overton
Principal Planner
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, Hawai‘i 96813

U.S. MAIL AND EMAIL

Hawai‘i Dairy Farms, LLC
P.O. Box 1690
Kolos, Hawai‘i 96756-1690
HDF@Group70nt.com

Re: Comments on Hawai‘i Dairy Farms’ Environmental Impact Statement Preparation Notice

To Whom It May Concern:

This letter is sent on behalf of Kawailoa Development LLP (“Kawailoa Development”) to provide comments on the Environmental Impact Statement Preparation Notice (“EISPN”), published in the Environmental Notice on January 22, 2015, for the dairy farm (“Dairy”) proposed by Hawai‘i Dairy Farms (“HDF”) in Māhā‘ulepū, Kaua‘i.

Kawailoa Development is the owner of the Grand Hyatt Kaua‘i and the Poipu Bay Golf Course. Kawailoa Development has a substantial interest in the Environmental Impact Statement (“EIS”) process, pursuant to Hawai‘i’s Revised Statutes (“HRS”) chapter 343, as both the Grand Hyatt Kaua‘i and the Poipu Bay Golf Course will be directly affected by the operations of the Dairy. The project boundary of the Dairy will be less than a mile from the boundary of the Poipu Bay Golf Course and a mere mile and a half from the boundary of the Grand Hyatt Kaua‘i. Kawailoa Development therefore requests that it be a consulted party pursuant to Hawai‘i’s Administrative Rules (“HAR”) § 11-200-15.
I. OVERVIEW

This project is of significant public interest. Not only will the project affect the
over 1,400 employees at the Grand Hyatt Kaua‘i and Poipu Bay Golf Course, but adverse
consequences resulting from the Dairy’s operations will be a concern for all who visit,
live or work in the Po‘ipu and Koloa area. The full-scale operations of the Dairy have already been
acknowledged by Hawai‘i Dairy Farms to be a Concentrated Animal Feeding Operation
(“CAFO”), and at 2,000 cows, or even 699 cows (HDF’s purported first phase), the Dairy will be
one of the largest and most concentrated in the State. As the U.S. Environmental Protection
Agency (“EPA”) has stated, “The concentrations of waste from these animals increase the
potential to impact air, water, and land quality.” Given such potential impacts, a careful and
deliberate review of the environmental impacts is imperative before permits are granted.

Kualoa Development offers its comments in two categories: comments on the
EIS process and comments on the scope of impact evaluation.

II. COMMENTS ON THE EIS PROCESS

A. An After-The-Fact EIS Violates Chapter 343

For the reasons set forth in its Second Amended Complaint, filed ex officio on
December 9, 2014 in Civil No. 14-1-6141 IRV, pending before the Circuit Court of the Fifth
Circuit, Kualoa Development disagrees with HDF’s statement that “[n]one of the agricultural
operations associated with the [Dairy] constitute a ‘trigger’ under HRS Chapter 343
requirements.” EISPN at 4-2. In brief, HDF has proposed to construct and operate a wastewater
treatment unit and is therefore required to study the impacts of its wastewater treatment unit and its
Dairy as required by HRS Chapter 343. HDF’s statement that the EIS is “being prepared
voluntarily,” EISPN at 1-1, is flatly incorrect. HDF’s failure to disclose in the EISPN that the
Dairy will have a wastewater treatment unit constitutes a withholding of vital information.

On the cover page of the EISPN, HDF states that the document was “prepared
pursuant to Hawai‘i Revised Statutes, Chapter 343, Environmental Impact Statement Law
and Chapter 200 of Title 11, Administrative Rules, Department of Health, Environmental Impact
Statement Rules.” See also EISPN at 4-2 (the EISPN was prepared “pursuant to HRS Chapter
343 and HAR Chapter 200”). According to the EISPN, however, HDF purports to have already
received the following permits and approvals:

- County of Kaua‘i - Building Permit (November 2014)
- County of Kaua‘i - Grading and Grubbing Agricultural Exemption (March
  2014)
- State of Hawai‘i Department of Health Wastewater Branch - Animal
  Feeding Operation/Waste Management Plan (October 2014)

- U.S. Department of Agriculture Natural Resources Conservation Service –
  Agricultural Conservation Plan (no date provided)

EISPN at 2-4. The EISPN fails to disclose that HDF also received approval from the
Department Wastewater Branch for its Individual Wastewater System on April 23, 2014. See
Exhibit A. Additionally, there are applications for permits and approvals currently pending
before the Department and other State agencies, including the National Pollutant Discharge
Elimination System (“NPDES”) Construction Stormwater General Permit and Historic
Preservation Review.

It is well-settled that the purpose of Chapter 343 is informed decision making.
HRS § 343-1 (“It is the purpose of this chapter to establish a system of environmental review
which will ensure that environmental concerns are given appropriate consideration in decision
making along with economic and technical considerations.”). Hence, the Hawai‘i EIS Law
requires that, “the agency initially receiving and agreeing to process the request for approval
shall require the applicant to prepare an environmental assessment of the proposed action at the
earliest practicable time.” The EIS rules mandate that,

An EIS is meaningless without the consentsentential application of the
EIS process as a whole, and shall not be merely a self-serving
recitation of benefits and a rationalization of the proposed action.
Adequate agencies shall ensure that statements are prepared at the earliest
opportunity to the planning and decision-making process. This
shall assure an early open forum for discussion of adverse effects
and available alternatives, and that the decision-makers will
be enlightened to any environmental consequences of the proposed
action.

HAR § 11-200-14 (emphasis added). HDF’s EIS process will result in the very “meaningless”
EIS contemplated by the rules. Where permits have already been issued, the EIS will be the
contemplated “self-serving recitation of benefits and a rationalization of the proposed action.”

The Hawai‘i Supreme Court has long held that an EIS must precede any state or
county approvals. See, e.g., Molokai Homesteaders Coop. Ass’n, 63 Haw. 453, 467-68, 629
P.2d 1134, 1144 (1981) (noting that an EIS is a “prerequisite” for Board approval of a request);
(holding a land reclassification petition as the earliest practicable time at which to prepare the
environmental assessment). Further,

[Decisions reflecting environmental considerations can most
easily be made when other basic decisions are also being made,
that is, during the early stages of project conceptualization and
planning. ... [E]arly environmental assessment comports with the
purpose of HEPA to alert decision-makers early in the
development process because, "after major investment of both time and money, it is likely that more environmental harm will be tolerated."

Sierra Club, 109 Hawai'i at 419, 126 P.3d at 1106 (citations omitted) (emphasis in original). Since the EIS informs the decision-making process, it is an abuse of the EIS process for HDF to propose an EIS that rationalizes approvals that have already been issued. Environmental review after decisions have already been made is "a post hoc rationalization to support action already taken." Citizens for the Protection of the North Kohala Coastline v. County of Hawai'i, 91 Hawai'i 94, 105, 979 P.2d 1120, 1131 (1999).

Here, HDF proposes an after-the-fact EIS that violates Chapter 343. Although HDF has stated that it prepared the EISPN and will prepare the appropriate environmental documents in accordance with HRS chapter 343, it already sought and received apparent approval for portions of its proposed action without first satisfying the mandates of Chapter 343. Moreover, based on such approvals, HDF has already conducted site work that is part of and necessary to the construction of its Dairy. By placing the curtail before the horse, the EIS process is turned on its head. Environmental assessments and environmental impact statements are the bases for future decisions, permits and approvals. The EIS does not presume such decisions, permits and approvals. If conducted only after the decisions have been predetermined, however, a mockery will have been made of the EIS process.

In sum, this EISPN and any EIS prepared in accordance with it do not comply with the procedures mandated by Chapter 343 and its implementing rules. Without waiving its right to challenge the process proposed by HDF which violates Chapter 343, Kaua'i Development provides further comments below.

B. Alternatives Must Be Considered

Hawaii Administrative Rules ("HAR") § 11-200-17(f) sets forth a list of categories of alternatives to be considered and directs that "[p]articular attention shall be given to alternatives that might enhance environmental quality or avoid, reduce, or minimize some or all of the adverse environmental effects, costs, and risks." HDF must carefully consider at least two additional alternatives in its Draft EIS.

First, the alternative locations that the EISPN proposes to consider as required by HAR § 11-200-17(f)(5) are arbitrarily limited to the island of Kaua'i. EISPN at 2-3. There is nothing in HAR § 11-200-17(f)(5) that limits "alternative locations" to those on the same island as the proposed project. It is appropriate and important that the EIS consider alternative locations on all islands. Given the size of the Dairy either at initial or at full-scale operations, milk production and distribution will not be limited only to Kaua'i. Kaua'i has no milk processing facilities. Among other things, HDF must consider the environmental impacts incident to transportation of its milk products in its EIS and compare those to statewide locations that are larger and/or better suited than Māhā‘ulepū valley and where inter-island transportation for milk processing may not be required.

Second, the Draft EIS must consider "[t]he alternative of postponing action pending further study..." HAR § 11-200-170(4). In-depth studies on environmental and cultural issues, and particularly impacts to groundwater and surface water, must be undertaken before the dairy can be constructed. As will be discussed below, the Dairy at full-scale operation poses serious, irreversible risks to Māhā‘ulepū and it is crucial that in-depth research is conducted prior to the Dairy’s operations.

C. Discharges from the Dairy Must Be Identified and Evaluated

HDF’s EISPN makes the cavalier and conclusory statement that its Dairy will be “zero-discharge.” EISPN at 1-2, 2-2, 3-4. While this might be a marketing slogan or a hoped-for result, the extent and nature of the discharges to be generated by the Dairy should be the result of careful and scientific study conducted via the EIS process. Whether there might not be any point-source discharge is subject to serious debate, but the fact of the matter is that there will be discharge. As indicated by the Dairy’s own statement in Section 4.0, “Potential for increased air and water emissions will be evaluated in the Draft EIS.” HDF’s assumption that its Dairy is zero-discharge misleads the public and foretells a dangerously breezy Draft EIS. If HDF assumes no discharges (presumably because it says so), then there will be no impacts to evaluate in a Draft EIS. Such an assumption relating to the nature and extent of discharges (whether nutrients, organic matter and/or bacteria) is at the heart of this matter. An in-depth consideration of the environmental ramifications of Dairy operations, and their related discharges is required.

HDF’s claim of zero-discharge, whether defined as in the EISPN as zero discharge with respect to nutrients in the manure, or by any other means, EISPN at 2-2, is contradicted in the EISPN itself. A detailed root zone soil water balance, for example, would not have been required to show available water holding capacity throughout the year with the proposed rainfall, irrigation, manure loading, wastewater loading, and salt-impervious water that will percolate onto the fields.

Moreover, the Draft EIS should describe how many of the 2,000 cows are milking and dry, or just milking. The description of the associated ancillary stock should also include how many cows are cly, replacement heifers, bulls, or pre-weaned calves. The location of each cow should be described, as well as the plans for their shelter during inclement weather. The location also affects the amount of nutrients in the pasture. The Draft EIS should describe the paddock rotation schedule. The long transit times may translate to more manure deposited on cow runs, where no plants are growing, as opposed to the pasture.

Even assuming there is no point source discharge from this facility, there will be obvious storm water discharge. Grazing cattle will deposit feces and urine as they graze, and these fecal parts are prone to intense rainfall events. Nutrients, organic matter, and bacteria will be discharged through storm water from the paddocks to waterbodies. The potential for storm water to carry nutrients and manure from the feedlot areas and pastures to the ditches draining the property and ultimately to the coast must be carefully and thoroughly evaluated. The Draft EIS should also describe its drainage plans and whether depressions in the field will be drained with buried perforated pipe or surface drains to reduce ponding and vector breeding.
III. TECHNICAL SCOPING COMMENTS

Technical, scientific comments are provided by Kawaiola Development with the assistance of two experts: Dr. Deanne Meyer and Mr. Mark Madison in sections III.A, B, and C, below. Dr. Meyer is a Research Scientist and Cooperative Extension Specialist in the Department of Agricultural Science at the University of California, Davis (UC Davis). Mr. Madison is an agricultural, environmental, and civil engineer, and senior project manager with CH2M HILL, a global engineering and consulting firm.

A. Groundwater

Section 3.1.1 of the RISP provides that the Māhā‘ulepū well site contains up to 14 irrigation wells drilled by former sugar plantations and "[d]rinking water and irrigation water supply for HDI, and ground water quality will be addressed in the Draft EIS." The RISP fails to acknowledge that the Dairy will impact groundwater. The environmental impacts on groundwater cannot be ignored in the Draft EIS.

The environmental impact of potential wellhead inundation with wastewater must be quantified. Wellhead analysis is crucial to prevent pollution migration to groundwater. Therefore, existing wellhead installation reports need to be analyzed to ensure no environmental impacts will occur from manure storage or application events. The analysis should include the potential lateral movement of manure or feed nutrients through soil to wellheads.

In addition, the non-uniform application of urine and feces by grazing dairy cattle can lead to groundwater contamination. The environmental impact of the cattle mob’s grazing activities on groundwater, surface water, and air emissions must therefore be quantified. Furthermore, proper wellhead installation practices for new wells must be identified and followed to protect the wells from contamination of manure effluent.

The environmental impact of the over-application of liquids from the storage pond at times when storage capacity is insufficient—such as in times of rain—must be quantified. This is especially critical during wet periods; the Draft EIS must address the increased groundwater contamination potential from irrigating well-drained soils during wet periods.

The animal cemetery also needs to be analyzed, particularly because the cemetery appears to be located in soil with a 6-12% slope. Digging the defined trenches for mortality may be challenging in sloping soils and erosion control will be essential. Runoff will need to be diverted so that the cemetery will not be inundated and the decomposing animals will not leach into the groundwater. Animal disposal issues in a catastrophic event may exceed the assimilative capacity of the soil at the animal cemetery to treat and remove nutrients and fluids of decomposing cattle. Additionally, it is apparent that a riverine is located next to the paddock with the cemetery. Management of the riverine is important to ensure it does not flow onto the cemetery. The Draft EIS should assess if positive drainage will exist to minimize the ponding of rainwater and to prevent deep percolation near feed or waste storage locations and the animal cemetery.

Because the nitrogen cycle is inefficient, with losses occurring from application to plant uptake, it is critical that the Draft EIS examine the nutrient balance in the watershed. Because the desired rates of growth for the kikuyu grass will require importing high quantities of fertilizer, the environmental impact for this must be quantified. Nutrient application rates should be compared to site specific conditions that may differ from values in the NRCS 590 Nutrient Management standard. Environmental monitoring of the groundwater wells is critical to ensure safety of the groundwater supply. Moreover, monitoring is important to ensure that volatilized ammonia will not damage surface water or plant productivity once deposited back to the water or ground. Examination of the nutrient balance should consider: (1) nutrient loads from milking cows, dry cows, and calves; (2) actual net removal of nutrients in a grazing system, as net removal is generally very low in grazed systems (cattle are voiding wastes as they are eating); (3) ammonia volatilization and denitrification; (4) total waste production (urine and manure); and (5) nitrogen carboyer from one year to the next from incomplete mineralization of organic nitrogen. The impact on groundwater will accumulate over time and should be presented in a long term nutrient plan accounting for all forms of nitrogen.

The phosphorus index is an index value that identifies if there are sufficient or insufficient amounts of phosphorus in the soil. It is important to have a feedback mechanism to evaluate if the targets of the Dairy are achieved and if they are not, what modifications need to occur and what potential environmental ramifications may occur as a result. The phosphorus index value calculations should therefore be reviewed to determine how soil storage capacity for phosphorus will be exceeded. The impact of elevated phosphorus in groundwater and coastal freshwater should be presented and a timeline for phosphorus breakthrough should be projected.

B. Surface Water

Section 3.1.3 of the RISP fails to disclose that two defined and regulated State Waters traverse the Dairy property, improperly characterizing them as "ditches." According to the Hawai‘i Clean Water Branch Water Quality Map, two streams run through the middle of Māhā‘ulepū valley and discharge into the ocean. State water quality data designates the two streams in Māhā‘ulepū valley as Class 2.

The objective of Class 2 waters is to protect their use for recreational purposes, the support and propagation of aquatic life, agricultural and industrial water supplies, shipping, and navigation. The uses to be protected in this class of waters are all uses compatible with the protection and propagation of fish, shellfish,
and wildlife, and with recreation in and on these waters. These
vessels shall not act as receiving waters for any discharge which
has not received the best degree of treatment or control compatible
with the criteria established for this class. No new treated sewage
discharges shall be permitted within estuaries.

HAR § 11-54-3(b)(2) (emphasis added). The two streams in Māhā'ulepū valley converge and
are classified as Class I as the waterbody approaches the Māhā'ulepū coast and discharges into
the ocean.

It is the objective of Class I waters that these waters remain in their
natural state as nearly as possible with an absolute minimum of
pollution from any human-caused source. To the extent possible,
the wilderness character of these areas shall be protected. Waste
discharges into these waters is prohibited, except as provided in
section 11-54-4(c). Any conduct which results in a demonstrable
increase in levels of point or nonpoint source contamination in
class 1 waters is prohibited.

HAR § 11-54-3(b)(1) (emphasis added). The waterbody discharges into the ocean, which is
classified as Class A.

It is the objective of Class A waters that their use for recreational
purposes and aesthetic enjoyment be protected. Any other use
shall be permitted as long as it is compatible with the protection
and propagation of fish, shellfish, and wildlife, and with recreation
in and on these waters. These waters shall not act as receiving
waters for any discharge which has not received the best degree of
treatment or control compatible with the criteria established for
this class.

HAR § 11-54-3(c)(2) (emphasis added).

The Draft EIS must properly characterize the two state waters flowing through
the middle of the Dairy and evaluate impacts to the stated goals for these waters and the adjacent
marine waters

In addition, HDF fails to identify wetlands in and adjacent to the dairy property.
According to the U.S. Fish and Wildlife Service’s National Wetlands Inventory map, there are
seven bodies of water within the upper half of the Dairy’s property boundary. Additionally, there
is a wetland just south of the Dairy’s property boundary. The identification of wetlands is
important as they feed downstream waters, trap floodwaters, recharge groundwater supplies and
provide fish and wildlife habitat. In the Draft EIS, HDF must, with input and approval from the
U.S. Army Corps of Engineers, delineate the boundary of wetlands within its property. The

Draft EIS must evaluate Dairy impacts on these regulated wetlands. The Draft EIS must also
evaluate whether activities impacting wetlands are subject to regulation under Swampbuster
provisions of the Food Security Act of 1985 that discourages the conversion of wetlands to
ecrop land use.

Given the presence of surface waters throughout the Dairy, it is important to
protect riparian areas during construction as well as operation. The Draft EIS should address
whether cattle will be fenced out of the riparian areas or whether water flow will be altered to
avoid the areas with cattle. Depending on the type of fencing used, construction could generate
erosion resulting in sedimentation in riparian areas and surface waters.

The Dairy is located at the bottom of a steep watershed with a creek flowing
through the center of the manure application fields. Additionally, the perimeter of the property
has greater slopes, which is problematic because runoff will likely be greater from these areas
and will be directed through the paddocks. Therefore, the potential for flash floods to flow over
the farm may be high. A detailed hydrologic analysis and storm water flow projection should be
conducted and compared to the capacity of the stream channel to project field flooding and
flashing. The Draft EIS should determine whether concrete or roofed surfaces increase runoff to
surface waters during severe storm events, and whether intense rainfall events will result in pond
inundation or runoff at manure from pastures.

Surface water exiting the property should be monitored during storm events
before land is disturbed, during construction, and after the Dairy is operational. Monitoring
activities should include an analysis of pH, temperature, turbidity, fecal coliform and BOD5.
Analysis of downstream sedimentation will be important, particularly because subsequent runoff
from roads and manure may impact sedimentation. That is, the Draft EIS should analyze the
amount of sediment (depth), the dimension of the active water path (streams, creeks), and
whether there is flow or flow pattern in downstream surface waters that may be harmed by
sedimentation and runoff.

The impact of storm water runoff on surface water during construction must be
analyzed. Construction activities could result in the degradation of receiving water, especially
during storm events. The construction of buildings, fences and roads, and the installation of
irrigation systems must be evaluated with respect to soil conservation and prevention of erosion.
Storm water discharge should be sampled to ensure that environmental impact is not occurring;
this would include the first water running off during a storm event as well as sampling during
large rainfall events (1" or more in 24 hours).

The Draft EIS should also study how the Dairy’s operational activities will affect
surface water. The environmental impact of runoff from areas of intensive use (including the
area where cows enter the milking parlor, gate openings, cattle water troughs, cow walkways,
and roads) must be identified. The Draft EIS should assess if mud will accumulate (and
potentially be carried in storm water runoff) in these intensively used areas.
Any potential failure of the retention pond storage structure and its environmental impact must be identified. If pond failure results in over-application of effluent to fields, impacts to groundwater must be identified and analyzed.

The water balance and irrigation schedule must be examined in detail, including soil water holding capacity by soil type, hydraulic loading from irrigation, precipitation, and evapotranspiration (ET). Evapotranspiration estimates should be based on Penman-Montiel calculations of crop ET from reference crop ET. The southwest corner of the farm contains shallow soils over bedrock that will need to be managed. This area will be drip irrigated with fresh water, but nutrient loading will come from periodic application of settling pond solids.

Finally, irrigation system failure or wind drift of irrigation with effluent must be accounted for, and the potential impact on surface water must be determined so that appropriate setback distances may be identified. The Draft EIS must examine the potential for malfunction of the GPS system and for unintended, accidental irrigation of effluent directly on the crop, drainage ditches and raceways. The Draft EIS must also describe and evaluate whether the irrigation system will adequately correct for wind speeds and directions during irrigation.

C. Air Quality

The EISPN broadly states that air quality conditions and agricultural odor conditions will be evaluated in the Draft EIS. EISPN at 3-3. However, the discussion of air quality in the EISPN is oversimplified. First, construction related activities may generate dust emissions, including PM10 and PM2.5, as well as exhaust emissions. Second, the Dairy’s operations may generate exhaust emissions from daily operational activities. PM emissions may be generated from project operational activities, including vehicular traffic on unpaved roads and access roads, animal movement on unpaved surfaces, and equipment operation. Third, project operations may also generate ammonia and hydrogen sulfide emissions. Ammonia deposition in surface waters or plants should be evaluated.

Additionally, the Draft EIS should analyze the animal facilities as a source of flies, mosquitoes and odor. The following odor and gas emission sources should be considered: milking parlor, effluent lagoons, and manure directly deposited on pasture by cows, effluent irrigation, and periodic solids application from the lagoons. The Draft EIS should analyze the potential for periodic sludge applications from the settling pond via “gun” application to produce odors, and identify options for reducing the odor potential. The Draft EIS should also address the need for monitoring and for adaptive management to control odor issues (such as sludge application methods and adequate aeration of the effluent pond to control odors). Drug sock (LEPA; technology on the center pivots should be included in the evaluation as a potential means of providing both efficient irrigation (uniform application) while at the same time greatly reducing the potential for odors.

February 23, 2015
Page 11

Greenhouse gas emissions from the cows, decomposing manure, decomposing buried dead animals and Dairy operations should be quantified.

The Draft EIS must also assess air impacts from transportation of the Dairy’s unprocessed milk to a neighbor island for processing. It is unclear whether the Dairy has committed to returning all processed milk to Kaua‘i for sale. If the intent is to return processed milk to Kaua‘i for sale, then air quality impacts from this additional transportation must also be included in the analysis of air quality impacts in the Draft EIS.

D. Socio-Economic Conditions

The EISPN states that “a projection of the HDF’s anticipated economic impact will be included in the Draft EIS,” in the context of a paragraph regarding the amount of milk needed to sustain 70,000 people on the island of Kaua‘i. EISP at 3-3. This paragraph inaccurately describes economic impact of the Dairy on the Kaua‘i community. The businesses in the surrounding area, including the Grand Hyatt Kaua‘i and the Poipu Bay Golf Course, will be directly affected by odor and flies from Dairy operations. The Grand Hyatt Kaua‘i employs more than 1,000 residents of Kaua‘i, and hosted many visitors, conventions and functions in 2014. The economic impacts of odors and flies, which will not be welcomed by surrounding businesses and their guests and customers must be studied in detail in the Draft EIS so that decisionmakers issuing approvals can evaluate the economic impact of the Dairy on the Kaua‘i community.

Finally, “HDF will grow Kikuoyu and Kikuoyu-Queens grass throughout the pastures.” EISP at 2-2. These grasses have been considered to be invasive. The economic impact of these invasive grasses on surrounding land areas must be identified and evaluated.

E. Soils and Topography

Although Section 3.1.3 states that no changes in topography will occur, HDF’s Waste Management Plan (“Waste Mgt. Plan”) states otherwise. According to the Waste Mgt. Plan dated July 23, 2014, “[a] secondary berm will be constructed downhill of the effluent ponds at the edge of the paddock before the existing drainageway and farm road.” Waste Mgt. Plan at 49. Additionally, the Waste Mgt. Plan describes a raceway which will act as a berm to separate the paddocks from any water ways. Id. at 40. Further, HDF’s plans to install a drip irrigation line, id. at 30, are also an indication that soil will be disturbed if the line will be underground.
The extensive poorly drained, clay soils at the site may be subject to compaction with cattle grazing when soil conditions are wet, reducing grass nutrient utilization and increasing runoff. The claim that the combination of management of soil moisture with robust kikuyu batch will prevent soil damage is improbable and should be further evaluated. The Draft EIS should also evaluate how manure will be kept on the pasture as fertilizer given the greater amount of runoff.

The Draft EIS should examine possible differences in grass growth and yield between research test plots without cattle and plots with rotational grazing. If the soils are currently depleted of the essential nutrients required for crop growth, reasonable estimates of yield must be used. When nitrogen is applied to meet higher yield expectations and the yields are not achieved, the excess nitrogen is likely discharged into the environment. This increases the amount of nitrogen quantity in the landscape and results in the release of greenhouse gases. Moreover, biological processes involved in the nitrogen cycle make it unlikely that recovery of 100 percent of applied nitrogen occur in an animal operation. Therefore, the Draft EIS must consider impacts associated with the “learning curve” of bringing the land from being marginal in production to being high-producing forage land. It must also define the cumulative impact of importing the nitrogen into the watershed on a recurring basis. Finally, the Draft EIS should study the impact of continuous kikuyu growth at high rates on the quality of the topsoil.

F. Botanical and Faunal Resources

In 2008, the National Park Service (“NPS”) published a reconnaissance survey of Māhāʻulepū in order to provide a preliminary evaluation of the resources of Māhāʻulepū for potential inclusion in the national park system. According to NPS, habitats for five endemic endangered birds are scattered throughout Māhāʻulepū. Id. at 19. The endemic endangered birds known in the area are the Hawaiian coot (ʻulaʻulaʻua), common moorhen (ʻūlea ʻūle), Hawaiian duck (koloa mua), Hawaiian stilts (ʻaeʻo), and the Hawaiian goose (nēhē). Id. Intermittent streams and wetlands at Māhāʻulepū provide habitats for these birds, and ōneōne and koloa are known to frequent the two lease land in Māhāʻulepū valley. Id. The broad natural depression in this valley fills with water after heavy rain and draws many water birds, including sixty koloa during one such event. Id. The wetlands in Māhāʻulepū valley are also hydrologically linked to the Makawao Cave complex, a critical habitat for endangered arthropods that rely on seepage of nutrient-rich water. Id. at 29.

According to NPS, “[b]ecause sensitive conservation areas are mingled with active agricultural land throughout the study area, future activities on agricultural land could cause major impacts on significant sources.” Id. at 52. NPS concluded that the natural and cultural resources of Māhāʻulepū “are deemed nationally significant. These areas encompass unique geologic landforms and fossils, rare species and habitats, and storied sites important to native Hawaiian and United States history.” Id. at 49.
February 23, 2015
Page 15

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- Evaluate restoration of Dairy land at the end of the Dairy lease period to prevent typical reversion to domination by the large African grass known as Guinea grass (Panicum maximum; Carpenter, 2008), which are then invaded by the fast-growing tree known as albizia (Falcataria moluccana).

- Consult with the USFWS to determine whether USFWS intends to designate the Dairy area as a critical habitat for any floral, faunal or insect species in its intended upcoming designation of critical habitat on Kaua’i.

- In addition, the intended “assessment of arthropods/vector insects (e.g., flies)” in the Draft EIS should include and assessment of the likelihood of wind patterns transporting these insects to the Poipu Bay Golf Course, the Grand Hyatt Hotel and other properties in the Poipu area.

In addition, the Dairy should evaluate its inability to mitigate impacts on avian species. For other Kaua’i projects, the USFWS has required that, “If a Hawaiian waterbird or Hawaiian goose is observed in the vicinity of project operations, all harvesting and other activities that may be disruptive will cease until the bird(s) disperse from the area through their own volition.” See Letter from USFWS to Green Energy Hawaii, LLC dated October 3, 2011. Unlike the harvesting operations contemplated by Green Energy Hawaii, which could cease, Dairy operations cannot. In other words, with an alternate location on Kaua’i to which the cows can be moved, the Dairy will not be able to remove all cows from the facility until birds disperse of their own volition, and the birds will continue to be impacted by Dairy operations.

The Draft EIS must evaluate the Dairy’s inability to implement mitigation measures required by USFWS of other Kaua’i projects.

Since Dairy construction has already begun, and test fields are already in operation (EISP at 2-2), it is too late for the Dairy to evaluate the impacts of these activities on flora and fauna. This evaluation, however, should have preceded agency decisionmaking regarding these activities, as required by Chapter 343. The Draft EIS must evaluate this failure.

G. Comprehensive Nutrient Management Plan

The Comprehensive Nutrient Management Plan (or Conservation Plan), which was apparently approved by the U.S. Department of Agriculture’s Natural Resources Conservation Service, contains information essential to the EIS. The information contained in the Plan may be important to the extent it relates to the Dairy’s impacts on the environment. It should be referenced in and attached to the Draft EIS so that its content is available to the public for review and comment as part of the EIS process.

IV. CONCLUSION

The approvals and permits purportedly already received by HDF for its Dairy are invalid. Such approvals and permits, if any, should have been preceded by the EIS and should be the result of the EIS process. To attempt the reverse, would turn the EIS process on its head. An after-the-fact EIS undermines the very purpose of the EIS process. HDF cannot be allowed to circumvent Hawaii’s environmental laws.

Moreover, it is not enough for HDF to repeatedly assert there will be no discharge. Just because HDF says so isn’t sufficient for the EIS process. The Mäkä‘alepia area, including the ground water and nearby Class I waters, are pristine and irreplaceable, and any discharge will cause irreparable damage. Once the harm has been done, any remedies will be wholly lacking and unsatisfactory. HDF proposes a highly intensive use of the land, and the Dairy will directly affect both the quality and quantity of runoff water that inevitably will find its way into the streams, wetlands and ocean or seep into the groundwater table. Because the Dairy will have such widespread effects, Kaua‘i Island Development requests that it become a consulted party.

Very truly yours,

Lisa Ball

cc: Jon Fukada, Kaua‘i Island Development LLP
Virginia Presler, Director, Hawaii Island Department of Health
Encl.: Hawaii Island Dairy Farms’ Individual Wastewater System permit
Dear Ms. Bail:

Thank you for the input dated February 23, 2015 representing Kawailoa Development LLP’s comments on the Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice (EISPN). We acknowledge your comments about the project, and offer the following responses.

HDF seeks to establish and operate a sustainable, rotational-grazing pasture dairy farm in Mähe‘ulepu‘e Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as fertilizer for pasture grass to provide the primary source of nutrients. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will provide a local food source appropriate for cow health and quality milk production, and will initially comprise 70 percent of the animals’ diet.

I. EIS Process

HEPA and HRS

As you are aware, Hawai‘i Dairy Farms (HDF) stepped forward in response to community concerns about the dairy in the Po‘ipū area and offered to prepare a comprehensive Environmental Impact Statement (EIS) for the proposed project. It is the purpose of Hawai‘i’s environmental law, known as HRS Chapter 343 and “HEPA”, to “establish a system of environmental review which will ensure that environmental concerns are given appropriate consideration in decision making along with economic and technical considerations.” The HEPA process includes scoping discussions with regulatory agencies and the community to identify issues of concern. HDF engaged technical consultants to analyze probable impacts on environmental and societal conditions. Relevant local, state and federal ordinances, statutes, and regulations were considered. We believe the EIS demonstrates that this innovative dairy system will benefit the local and statewide community by advancing food sustainability.

HDF is in compliance with Chapter 343 requirements because none of the permits that have been obtained or the reviews that were completed triggered the...
requirements for an environmental assessment or and an EIS. The EIS being prepared by HDF therefore is not an "after the fact" EIS.

Chapter 343 would be triggered if an agency were to approve a wastewater treatment unit and the approval was a discretionary consent. However, the State of Hawai‘i Wastewater Branch never approved the Waste Management Plan (the “WMP”) submitted by HDF. It reviewed the WMP pursuant to Hawai‘i Administrative Rule § 11-65-07.1, which sets forth the requirements for non-domestic wastewater. The rule states that the director of the Department of Health or the director’s duly authorized representative “will review” the use and disposal of non-domestic wastewater. The WMP was for non-domestic wastewater. The position of the State of Hawai‘i Wastewater Branch, with which HDF concurs, therefore is that the review of the WMP did not trigger Chapter 343. Similarly, the U.S. Department of Agriculture Natural Resources Conservation Service only reviewed but did not approve HDF’s Conservation Plan.

The approval of the County of Kaua‘i’s Building Permit, the County of Kaua‘i’s determination that HDF is exempt from the Grading, Grubbing and Stockpiling ordinance of the State of Hawai‘i’s Wastewater Branch’s approval of the Individual Wastewater System were also not discretionary approvals for wastewater treatment units.

HDF nevertheless decided to prepare an EIS in response to community concerns about potential environmental impacts from a dairy farm with up to either 699 or 2,000 mature dairy cows. The purpose of an EIS is to provide disclosure of the environmental effects of a proposed project and HDF wants the community and the State of Hawai‘i to have the benefit of disclosure of its proposed project.

HDF Proposed Action

HDF is committed to establishing a herd of up to 699 mature dairy cows, and demonstrating the rotational-grazing pasture system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. The application process for a National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) permit includes public notification and input. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is currently estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.
Law Offices of Goodsill Anderson Quinn & Stifel
Hawai‘i Dairy Farms Environmental Impact Statement
May 26, 2016
Page 5 of 19

Project Objectives (Section 2.3.3):

1. Provide more than 1,000,000 gallons annually of fresh, nutritious milk for Hawaii families at affordable prices and revitalize the dairy industry in Hawaii.
2. Apply proven, sustainable rotational-grazing pasture system and state-of-the-art technology to reduce reliance on costly imported fertilizer and feed.
3. Grow local, quality grass as a primary feedstock optimal for dairy cow nutrition and health, utilizing results of forage research conducted at five sites across four Hawaiian Islands.
4. Design facilities to provide animal comfort, including maximum time on pasture and minimal milking time.
5. Effectively integrate dairy operations within the island community setting.
6. Optimize dairy product shipping and marketing.
7. Provide local farming employment and build the agricultural economy.
8. Protect and enhance the area’s natural, cultural, social and economic environment through sound agricultural planning, preservation of open space and protection of sensitive resources, and development of economic benefit.

Evaluation Criteria (Section 2.3.4):

1. Secure sufficient contiguous land area under long-term lease with adequate water supply (including potable water to meet standards under milk rules), suitable soil properties, gentle slope conditions, and road accessibility.
2. Generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk products processing and dairy business management.
3. Create a model for dairy operations utilizing IAL, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure to advance food self-sufficiency.
4. Utilize 100 percent of manure on site as nutrients to grow forage for dairy cows. Grow sufficient forage to provide 70 – 85 percent of feedstock required for the herd.

The essential differences as compared to the proposed action are highlighted in the following:

• Only one of the alternative actions (conventional feedlot alternative) would create a commercial-scale dairy operation in Hawaii, with the capability to produce 10 percent of the State’s fresh milk demand, reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criteria 4).

• None of the alternatives would secure a dairy location that meets the requirements of a rotational-grazing pasture dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

• One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).

• The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems, and support facilities (Criterion 3). However, it appears there was limited interest in such a venture after many years of trying.

• Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the three alternative scenarios would generate fewer beneficial impacts, and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast, the planned agricultural operations of Hawaii Dairy Farms were determined, after substantial analysis, to be the most viable option and the preferred alternative. Of all the alternatives considered, this is the only approach that meets each of the four Evaluation Criteria and achieves the eight Project Objectives.

Hawaii Dairy Farms will create a commercial-scale, pasture-based dairy operation in Hawaii, with the capability to provide more than 1,000,000 gallons of the fresh milk, reducing dependence on imported milk (Objective 1).

• The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

• The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

• Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

• Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The
alternatives evaluated would generate fewer beneficial impacts and produce impacts
that could potentially exceed those anticipated from the proposed project.

- Creating an economically viable rotational-grazing pasture model maintains
  agriculture, retains open space, and provides buffer between highly utilized resort
  and residential development and sensitive natural or cultural resources (Criterion 5).

**Discharge**

HDF will establish and operate a sustainable, pastoral, rotational-grazing dairy farm
in Māhāulepū Valley on the island of Kaua‘i to produce fresh, locally available
nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100
percent of the cows’ manure as fertilizer for pasture grass to provide the primary
source of nutrition. This cost-effective method will reduce reliance on imported
fertilizer and feed. Pasture grass will provide a local food source appropriate for cow
health and quality milk production, and will comprise at least 70 percent of the
animals’ diet.

Manure refers to both urine and feces, and is accounted for in the analysis of nutrient
impacts. For a description of surface water discharge, refer to the section, following.
The EIS contains a discussion of herd management and offsite herd management in
Chapter 3, Sections 3.4 and 3.7.

**II. Groundwater**

**Groundwater Impacts**

HDF will utilize an onsite well for potable water that was established a century ago
to serve the sugarcane plantation. The last of the 14 field wells developed between
1897 and 1928, it is the deepest of the wells drilled through alluvial material to reach
the aquifer deep within the volcanic series (refer to Draft EIS Section 4.16.2 and
Table 4.16-1 Information on Wells In and Near to Māhāulepū, Kaua‘i). The battery
of wells produced 3 MGD during use for sugarcane irrigation.

Four new onsite wells were installed by HDF to access groundwater in the alluvium
to facilitate an analysis of hydrologic connectivity and to establish baseline water
quality conditions. All of the wellheads are several feet above ground level; there will
be no wellhead inundation of any wells installed by HDF, or the wells installed by
the sugar plantations that HDF has located.

As part of the groundwater assessment conducted by Tom Nance Water Resource
Engineering (TNWRE), pump tests were conducted to determine whether there is any
relationship between two groundwater bodies in the area: in the shallow alluvium of
the valley floor; and the aquifer in the deep unweathered volcanic series. The
assessment determined there is no hydrologic connection (see additional detail in the
Draft EIS Section 4.16.1).

The groundwater and surface water analysis determined that the modest potable
water use rate for dairy operations, and the 4,500-foot distance between the
Māhāulepū 14 well and the nearest County potable water well (Kōloa Well F), will
result in no adverse impacts to ongoing use of groundwater in the unweathered
volcanic series, which is the source of potable water.

Though the waterbody in which the County wells occur is confined and
hydrologically separated from shallow waterbodies in the Māhāulepū Valley alluvial
material, HDF established a 1,000-foot setback surrounding the Kōloa F well in
agreement with the County Department of Water. Within this setback, no effluent or
commercial fertilizer will be applied, and no animals will graze in the area. The four
wells installed to facilitate confirmation of the disconnected hydrology of
groundwater in the shallow alluvium on the valley floor will be used in the future for
monitoring of water quality. Baseline data of nutrient and chemical constituents are
documented as Appendix E to the EIS. Results from the monitoring program will be
shared with the Department of Health Clean Water Branch, dairy neighbors and the
local Kaua‘i community.

**Pond Storage during Heavy Rains**

For the committed herd size of 699 mature dairy cows, the storage pond could
accommodate nearly one million gallons more than the NRCS design requirements
(Equation Reference source not found.). In normal operations, the storage pond
provides additional spare volume at the top of the pond. In the 699-cow scenario,
the spare volume is an additional 45 percent of the total volume design. In the 2,000-
cow scenario, the spare volume represents an additional buffer of up to 12 percent.

An emergency containment berm with capacity for an additional 30 days is included
in the design. This design exceeds regulatory requirements, with containment in
excess of the major rainfall events recorded in the valley over the past three decades.

A natural disaster plan has been prepared by the Hawai‘i Dairy Farms’ manager to
address hurricane, fire, and potential flooding hazard scenarios. HDF is not in a
tsunami inundation area, so this scenario is mentioned in the disaster plan only for
HDF personnel to maintain awareness. The disaster response plan outlines safety
procedures during the event, follow up actions, and emergency contacts for
assistance before, during or following the event.

**Animal Mortality**

Should animals die at the site, they will be buried at a designated area, following
plans for carcass management as specified in the Waste Management Plan reviewed by
DOH.

**Nutrient Balance**

Nutrient management is the practice of managing the amount, rate, source, method
of application, and timing of plant nutrients and soil amendments. The NRCS
Conservation Practice Standard 590 (referred to as Standard 590), Nutrient
Management, is applied to commercial fertilizers, organic by-products, waste water,
organic matter, and irrigation water. The timing and application of nutrients should

correspond as closely as practical with plant uptake, soil properties and weather
conditions.
A Technical Service Provider knowledgeable in NRCS Conservation Practices was retained to work with HDF technical advisors in determining a nutrient balance for the Māhā'ulepū site. Application of manure can be beneficial to soils by improving organic matter, increasing infiltration of water, and improving the soils’ ability to support pasture growth and root establishment.

As the cattle excrete on the Kikuyu thatch, nutrients are incorporated into what is effectively an organic net. Healthy soils contain primary decomposers such as earthworms and dung beetles that move manure into the soil profile when they burrow, aerating the soil to make organic materials accessible to secondary decomposers. Secondary decomposers include microbes (microorganisms) such as bacteria, protozoa, and fungi. The decomposition process breaks down manure into nutrient components that are readily available for uptake by the grass crop. In a healthy system, a manure pile can be removed from the soil surface within 24 hours. Even with the applied manure and effluent nutrients, the grass will need additional nutrients from conventional fertilizers to maintain optimum grass growth and yield goals with 699 mature dairy cows.

The contemplated herd size of 699 mature dairy cows would produce manure both within paddocks and in the milking parlor, providing additional organic nutrients and reducing the requirement of supplemental commercial fertilizer. EIS Chapter 3, Section 3.5 identifies the nutrient demand of the pasture crop across the 470 acres of grazed pasture, and applies the nutrients available from the committed herd size of 699 mature dairy cows to determine the remaining nutrients required from commercial fertilizers. Approximately 30 percent of the nitrogen and 36 percent of the phosphorus required annually would come from the committed herd size, requiring nearly 70 percent of nitrogen and 64 percent of phosphorus to come from commercial sources (see EIS Section 3.5, Table 3.5-1).

The NRCS Nutrient Management Standard provides a phosphorus leaching index for Hawai‘i soils. The leaching potential for each soil type at HDF is low, with an index value of 10 to 18 which is well below the upper index value of 30 still considered low. The moderate index ranges from 30 to 90, and the high index is for values above 90. Under the NRCS Nutrient Management Standard, on low risk soils, phosphorus can be applied at rates greater than crop requirements, not to exceed the nitrogen requirement for the succeeding crop, if manure or other organic materials are used to supply nutrients. Since the grass crop is not newly planted for each rotation and the growing season is constant and year-round, the phosphorus application is planned to be managed and adjusted to not exceed the crop requirement rate.

As a conservative estimate, the nutrient mass balance for the contemplated herd size assumes the grass yields do not increase. As shown in the EIS Section 3.8, the percentage of nitrogen provided by animals is 88.3 percent, an increase of 57.8 percent over the amount provided by the committed herd size to a total of 88 percent of the crop demand (shown in Table 3.8-1). The percentage of phosphorus increases by 68.4 percent from the amount provided by the committed herd size, to provide approximately 104 percent of the plant requirements. Several management options exist to keep phosphorus and other nutrients in balance, which may include and are not limited to: improved soil health from initial additions of phosphorus, reduction in contemplated herd size to approximately 1,875 mature dairy cows, or the expected increase in the grass yields from 16.3 tons of DM per acre per year to 20 tons of DM per acre per year (though an increase to 17.3 tons of DM per acre per year would be sufficient to bring phosphorus applications back into balance with crop demand and eliminate any phosphorus overage). Higher grass yields would demand additional phosphorus. Nitrogen from commercial fertilizer would be required at both 1,875 and 2,000 mature dairy cows.

It should be noted and planned that the commercial fertlization requirements to maintain high forage productivity and soil health can exceed the simple arithmetic difference between the nutrients applied by manure and the forage uptake. Rather, these values only represent the net amount of nutrients that need to be provided to and utilized by the crop through commercial fertilization, beyond the nutrient that is available to the crop from manure sources. Fertilization, especially the application of commercial nitrogen, can be inefficient with actual requirements with respect to forage production, and fertilization needs can be as much as 25 to 50 percent greater than the arithmetical difference resulting from a mass balance calculation - due to volatilization or soil sorption as mentioned above. Refer to the soils and agronomy analysis prepared by Russell Yost and Nicholas Knauger, University of Hawai‘i at Mānoa College of Tropical Agriculture and Human Resources (CTAHR), EIS Appendix C.

III. Surface Water

Water quality maps available on the Hawai‘i State Department of Health website with a date of June 2014 and labeled “Draft” do not reflect the current Hawai‘i Administrative Rules (HAR) §11-54, Water Quality Standards. Per §11-54-5.1 Inland water areas to be protected, and §11-54-6 Uses and specific criteria applicable to marine waters, all waters to be protected are listed in Appendices A, B, and C (dated July 1, 2014) of the HAR. No inland waters in the Māhā'ulepū watershed are included in the HAR §11-54 Appendix A. Therefore, no Class 1 Inland Waters exist in or around the HDF site. Marine waters downstream from the HDF site fall into open coastal waters Class A, as no embayments, marine waters, or open coastal waters in the area are included in the appendices of HAR §11-54 for special protection.

The aquatic features of the HDF site were described during the flora-fauna survey by Eric Guinther of AECOS Consulting. The description is contained in the flora-fauna survey report in Appendix A of the EIS. The HDF site is located on the bottom-land of the upper Māhā'ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha'upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā'ulepū Road. This ditch, named Waipi'i Ditch, is joined by a reach from the west that originates at a small unnamed
the drainageways. Specific stormwater controls to be implemented in the long-term include and structural controls, and are discussed in the EIS Section 4.17.4. After dairy establishment and when cows are on pasture, periodic sampling will enable comparison to ensure nutrient balance objectives are met (see EIS Section 3.3.3, Nutrient Balance).

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Koloa-Poipu region were also calculated. Nitrogen input to the marine environment in the Poipu region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimated potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poipu region are constant throughout the year and no mitigation is applied to reduce the quantities.

HDF has initiated a long-term ocean water quality monitoring program in conjunction with groundwater and surface water quality monitoring, to regularly sample and analyze nutrient and chemical constituent levels in the nearshore marine waters. The ongoing testing program will provide feedback to the dairy management team regarding changes in water quality. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kauai community.

The hydrologic assessment is included as Appendix K. The groundwater engineer and Nutrient Balance Analysis (NBA) utilize the Evapotranspiration Maps obtained from UH Manoa Department of Geography. A detailed irrigation schedule will be developed, evaluated, and adjusted with water quality monitoring. Irrigation systems are designed to utilize a droplet size that delivers water on the crop. No irrigation during windy conditions.

IV. Air Quality

Dust Emissions

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day. Using emission rates from the published literature therefore greatly overestimates potential emission from HDF, as cows in a rotational-
grazing pasture system will spend only two hours each day moving along cow walkways.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM$_{10}$ and PM$_{2.5}$) measured on the island of O‘ahu. This was considered the total impact and was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 milking cows was modeled, as at the lower threshold of 699 cows the potential fugitive dust impact would be negligible.

The estimated concentration for PM$_{10}$ is $2.01 \mu g/m^3$ per 24-hour period, which is well below the State standard of 150 $\mu g/m^3$. The estimated concentration for PM$_{2.5}$ is $0.23 \mu g/m^3$ per 24-hour period, which is well below the federal standard of 35 $\mu g/m^3$.

The estimated total annual particulate matter emissions were also for PM and greenhouse gases (GHGs). Total annual emissions (in tons per year) are typically estimated for potential permitting applicability. Results of the estimate for a herd size of 699 mature dairy cows for PM was 0.6 tons per year, and 3.3 tons per year for a potential future contemplated herd size of up to 2,000 mature dairy cows. The project will not require any permits under the Clean Air Act, or State of Hawai‘i counterpart.

Flies

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhā‘ulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pats in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōkua-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle grazing in the region on agricultural lands along Ala Knooki Road between Kōkua and Po‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animals wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

V. Socio-economic conditions

The potential impacts of Hawai‘i Dairy Farms to the existing economy and property values in the South Kaua‘i area were evaluated for the EIS. EIS Section 4.15 includes the complete presentation of socioeconomic conditions, and economic and fiscal impacts; the technical report is included as Appendix J of the EIS.

Hawai‘i Dairy Farms would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on Hawai‘i Island), only 10 percent of Hawai‘i’s milk is locally supplied. The Hawai‘i Dairy Farms project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately one million gallons of milk annually.
Short-term benefits will be created by development of Hawai’i Dairy Farms through jobs for local construction personnel and local material suppliers. Construction employment would be expected to average about 12 jobs annually during the development period. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and another 8 indirect jobs on O‘ahu. Thus direct-plus-indirect employment association with Dairy development would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

Once the facility is established and dairy operations have reached the committed herd size, approximately 11 direct and indirect full-time equivalent jobs would be sustained on Kaua‘i, including 5 farm jobs and about 6 indirect jobs. An additional 3 indirect jobs would be created on O‘ahu. For the contemplated herd size direct and indirect employment will roughly double.

Construction of the facilities at HDF would contribute approximately $9.1 million per year during the development phase. This includes direct equipment and construction expenditures, and indirect sales related to construction. Once fully operational with a herd of 609 mature dairy cows, annual direct-plus-indirect sales are estimated annually at $8.1 million on Kaua‘i, with an additional $2 million on O‘ahu.

Economic impacts of nuisance issues that could affect property values were examined. With a long history of agriculture, most of Kaua‘i has a rural ambiance. Most homes and visitor units on the island are within one mile of some agricultural activity; the rural character adds to the appeal of the island. The site of the Grand Hyatt Kaua‘i was rezoned from agriculture to resort; the resort opened in 1992 while sugarcane was still grown just mauka of the hotel property.

Sugarcane fields bordered Köloa on three sides, and bordered parts of Po‘ipū. Sugarcane fields were burned prior to harvest, creating smoke; dust and soil runoff followed field disturbance; and large canehaul trucks created considerable noise, dust and cane litter. The Köloa Sugar Mill emitted odors, smoke and noise. The distance of the mill to the nearest homes in Köloa is approximately 0.8 mile; proposed dairy activities would be 2.5 miles from the nearest home in Koloa. An agricultural transition to seed crops utilized land adjacent to the Po‘ipū Bay Resort Golf Course. Dust from disturbed, open lands was an issue, and concern of herbicide use drifting offsite dominated community conversations. Dust from proposed HDF operations would be minimal with grass as the cover crop.

With the demise of sugar and seed crops in Koloa and Po‘ipū, the cattle grazing for the beef market is now the dominant use of agricultural land in the region. Grazing lands to the east, north and west of Koloa total over 2,900 acres, which is reduced from over 3,300 acres before Māhā‘ulepū Valley was leased by HDF. In the near term, grazing is likely to expand onto most of the lands used recently for seed crops. In Koloa and Po‘ipū, grazing occurs less than 200 feet from some homes, less than 1 mile from some visitor units, less than one-third of a mile to the east and west of the main commercial area of Koloa, and less than 200 feet from a golf course.

Many of the homes in the region that are near cattle operations are in the northeast and eastern sections of Koloa; most of the homes were built before 1980 and are of modest size (less than 1,200 square feet). For these homes, the 2016 median assessed values ranged from $406,100 to $567,500. At the western end of Po‘ipū is Kukui‘ula—a luxury residential community that abuts grazing land. Most of the homes are newer, built after 2012, and most are large at over 2,100 square feet. For 2016, median assessed values of these residential lots and homes ranged from $1,297,150 for a lot, to $2,893,100 for a lot with home. Clearly, beef cattle operations are compatible with nearby homes, commercial areas, resorts and recreational areas. Although stocking densities are lower for beef cattle on unirrigated operations. No noticeable odors, flies, noise, waste or water discharges will reach resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area. The dairy will help maintain the existing rural character and ambience of the Koloa-Po‘ipū region.

Offsite Milk Processing
Under the proposed action, Hawai‘i Dairy Farms (HDF) would sell raw milk wholesale to a processor and packager. Milk processing, including pasteurization, bottling, and packaging of milk, would be done independently of HDF. Milk was previously processed on Kaua‘i by Meadow Gold at a facility in Puhi. The facility was closed in 2000. The facility could be retrofitted by Meadow Gold or in cooperation with Meadow Gold, the state’s only current milk processor and bottler with operational facilities on O‘ahu and Hawai‘i Island. One option for retrofitting the existing facility could be to pasteurize milk on Kaua‘i, then ship the pasteurized milk to another island for processing and packaging. Another option could be to retrofit the existing facility to bring the milk to market by pasteurizing, bottling, and packaging on Kaua‘i. This would be similar to the process for milk from the two existing dairies on Hawai‘i Island, where the majority of milk produced and processed is also sold on Hawai‘i Island. In addition to fluid milk, other milk products such as soft cheeses and yogurt could be produced as added-value products.

Alternatively, a new proposed facility could be sited on lands with appropriate zoning for milk processing, without a need for obtaining additional special permits. A determination of the best options will be made by the processor prior to instigation of HDF’s operations.
Pasture Grasses
Kikuyu grass was introduced to Hawai‘i in 1925 and is one of the most important pasture and range grasses in the State. Cultivation of pasture grasses at the HDF site will not extend the range of introduced grasses to native-dominated areas. Activities at HDF will not impact any areas dominated by native vegetation offsite, either upper elevation forests or coastal strand vegetation.

VI. Soils and Topography
Facility design utilizes guidance from the Natural Resources Conservation Service (NRCS), National Engineering Handbook (NEH) and from the American Society of Agricultural and Biological Engineers. Conservation practices established in NRCS technical guidance are incorporated both into the design and construction, including the animal walkways (Pacific Islands Area - PI - Code 575), the access road and waterway crossing (Codes 560 and 578), and heavy use area protection (PI Code 561).

The existing major drainage ditches on the site will be maintained. Within the 10-acre dairy facility area, swales will be installed as part of the drainage design to route stormwater run-off according to best management practices for livestock operations. In the pasture area, previously installed swales for agriculture and low-lying areas may be smoothed or filled in accordance with NRCS Practice Code for Land Smoothing, to improve surface drainage and uniformity for grazing.

Existing farm roads and cow raceways will be elevated above the pasture grade. Surfaces will be slightly crowned to ensure drainage to either side of the road or raceway and swales roughly 12-inches in depth will be created parallel to each road or raceway. Design and installation of roads, raceways and swales will be in compliance with the HDF Conservation Plan and utilize standards from applicable NRCS Practice Codes. Changes to topography, including improved drainage, are not anticipated to be significant over the long-term. See the EIS, Chapter 4, Section 4.2.

The classification of soils as poorly drained indicates the relatively slow rate of water movement within soil and to surrounding areas. Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas “drainage” refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity.

Soils classified as poorly drained often exhibit anaerobic conditions. Anaerobic conditions typically result in higher rates of denitrification, which is the conversion of nitrate and nitrite to gaseous forms. This essentially reduces the potential for nitrate impacts on nearby waterbodies. As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is usually reduced as well. In this way “poorly drained” soils may represent less risk of nitrate and nitrite harm to associated water bodies than “well drained” soils.
there are almost no suitable roost trees within the dairy site, thus it is not expected that the dairy farm will affect this listed mammalian species.

**Arthropods**

A study of invertebrate species and pest insects was conducted in January 2016 by Steven Lee Montgomery, PhD, Consulting Biologist. There are no known caves or lava tubes found at or adjacent to the dairy farm property. The Kōloa Lava Tube System, which provides habitat for two endemic cave species, the Kaua‘i Cave Wolf Spider and the Kaua‘i Cave amphipod, is located several miles away from the dairy farm property. Both invertebrates are listed as endangered under the U.S. Endangered Species Act. Not all caves in the Kōloa area contain these invertebrates, as most caves in the Kōloa District do not contain the optimal climatological conditions required by these organisms. Neither the botanical and faunal survey nor the invertebrate survey revealed any evidence of lava tubes or caves on the property, and no such features have been reported for the area near the HDF site. Thus no cave invertebrate species will be affected by the dairy farm.

**United States Fish and Wildlife Service (USFWS)**

Hawai‘i Dairy Farms has notified the USFWS regarding the location, scope, and intent of the dairy project. According to its EISPN response letter, it has no intent to designate any parts of the dairy area as critical habitat for any flora or fauna species. Effluent ponds will be surrounded by non-vegetated surfaces which are not expected to provide appropriate cover for nesting birds. Should birds be attracted to the effluent ponds, HDF will cover the ponds.

Fencing is discussed in Section 3.5.1 of the Draft EIS. A perimeter fence will be constructed of 42-inch hog wire topped with a strand of straight wire at 48-inch height to avoid entanglement with bats or birds. Barbed wire will be secured at ground level to deter rooting and entry by feral pigs. Interior paddock fencing will consist of two or three strands of electric wire mounted on wooden t-posts. Electric fences are more effective than wire fences at keeping cattle within paddocks. Fence design and construction will follow NRCS practice standards for the region.

Per the previous paragraph, many of the aquatic features described on the USFWS National Wetlands Inventory (NWI) are assigned codes that describe the habitat type presumed by the Inventory, as most information in the NWI was derived from aerial photographs and maps, not field investigations. According to CWRM (2005, 2008), there are no perennial streams in the Akahulepū watershed.

**VIII. Comprehensive Nutrient Management Plan**

The Conservation Plan was prepared by qualified technical consultant in accordance with NRCS technical guidance. For policy reasons, NRCS Conservation Plans are confidential documents.
Dear Ms. McIntyre:

Attached, please find Friends of Maha'ulepu's Comments on Hawai'i Dairy Farm's Environmental Impact Statement Preparation Notice. These comments were mailed to you last Friday via Certified Mail to 1250 Punchbowl Street, Honolulu, HI, 96813. As an added precaution, an additional copy of the comments is being mailed to you today to 919 Ala Moana Blvd., Room 312, Honolulu, HI, 96814. The attached letter, dated today, is a cover letter for that mailing.

Thank you,

Sarah A. Matsumoto

**PLEASE NOTE NEW E-MAIL ADDRESS: Sarah@tebbuttlaw.com**

Sarah A. Matsumoto
Associate
Law Offices of Charles M. Tebbutt, P.C.
941 Lawrence St.
Eugene, OR 97401
Ph: 541-344-3505 Fax: 541-344-3516

e-mail: sarah@tebbuttlaw.com

web: http://www.charlietebbutt.com

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FOM hereby explicitly requests to become a consulted party as provided by Hawai‘i Administrative Code § 11-200-15(b).

The enclosed comments also were sent via Certified Mail on Friday, February 20 to Group 70 International, Inc. and Hawai‘i Dairy Farms at the addresses above. In the interest of conserving paper, a second copy of FOM’s comments is not included in this correspondence to those entities.

Sincerely,

Sarah A. Matsumoto
Law Offices of Charles M. Tebbutt, P.C.

Encl. to Dept. of Health: 2/20/2015 Friends of Māhā‘ulepu’s Comments on Hawai‘i Dairy Farm’s “Environmental Impact Statement Preparation Notice”

No encl. to HDF or Group 70, Inc.
As an initial matter, FOM is very concerned that HDF is using the HEPA process merely to justify its already decided position that it will build a dairy at this location. The EIS process, of course, is designed to determine whether an action should occur given the environmental, social, economic, and cultural impacts. HDF has put the cart before the horse, assuming that approval for an already decided project will occur. The EIS process is not intended to be used as a justification for a decision already made. This is not the way HEPA works, and FOM anticipates that HDF will reconsider its position once the full gamut of negative consequences of a large dairy being placed in the Mā'ili Valley come to light.

In addition to a proper HEPA process, HDF must research the various local, state, and federal ordinances, statutes, and regulations that may impose additional requirements on its proposed dairy operations. HDF identified some of these in its EISPN, including the Hawai’i Constitution, Clean Air Act, and Clean Water Act. EISPN at 5-1. The EISPN did not list the Endangered Species Act, 16 U.S.C. § 1531 et seq., even though HDF is aware of at least four native bird species that are listed by both federal and state statutes as endangered. EISPN at 3-2. Moreover, all levels of government involved in decisions about this proposal must ensure that Hawai’i’s public trust obligations are protected.

FOM’s scoping comments below focus on both the EISPN and HDF’s “Waste Management Plan,” dated July 23, 2015. Both of these documents should be considered in the EIS process. FOM also hereby fully incorporates into its scoping comments the critique and review of HDF’s Waste Management Plan by Mr. Mark Madison, dated August 21, 2014 and those by Dr. Deanne Meyer, dated August 11, 2014. These documents were submitted to the Wastewater Branch of the Department of Health by Goedsell Anderson Quinn & Stiefel, on behalf Kawailoa Development LLP.

I. HDF’s Proposed Dairy Would Contaminate the Environment.

Despite touting that the dairy will originally house only 699 animals, HDF’s Waste Management Plan (“WMP”) clearly indicates that this facility is being designed from the ground-up to handle 2,000 head. A November 25, 2014 press release from HDF confirms that the dairy intends to expand its herd within months of beginning operations. As such, 2,000 head should be the number that is evaluated throughout this EIS process, not the deceptively low 699 figure used by HDF in its paperwork.

Even at 699 animals, however, there can be little doubt that this facility will cause and contribute to the contamination of the environment in and around the Mā‘ili’ulepu Valley and Kaua’i’s sensitive marine ecosystem. Dairies such as that proposed by HDF have been found across the country to contaminate surface water, groundwater, soil, and air. These negative environmental consequences primarily stem from the fact that a mature dairy cow produces significantly more waste than other animals. In fact, the U.S. Environmental Protection Agency estimates that a facility with 2500 dairy cattle creates a similar waste load as a city of 411,000 people. This means that HDF’s 2,000 dairy cows will produce, on average, the same amount of waste generated by a human population of 328,800. By way of comparison, the entire population of Kaua’i is 65,689 as of 2008. Stated differently, HDF’s proposed dairy would create five times more waste than the entire human population of Kaua’i.

Unlike human waste, however, which is required to be treated, HDF will dump the waste created by its herd directly onto the 517 acres of land it has secured for grazing.

The pollution that originates from HDF’s proposed facility will impact a variety of environmental media. Each is discussed in turn below, and each must be fully addressed by HDF in its EIS.

A. The Proposed Dairy Would Contaminate Surface Waters, detrimentally Impacting the Environment.

HDF’s proposed 2,000 head dairy will cause contamination of surface waters – waters that eventually discharge into the ocean near Gillin’s beach. Figure 5 of the WMP show both natural watercourses and man-made ditches traversing the proposed HDF site. These watercourses can properly be construed as “Waters of the State,” as well as “Waters of the United States,” protected by water quality standards. All of these ditches eventually lead to a stream that discharges into the ocean just a short distance away.

Importantly, the area where the discharges will occur has been designated as Class 1 critical habitat by the State. Critical Plant Habitat and Critical Cave Habitat designations also crisscross this coastline. In addition to these waters, there are two identified wetlands on the site, each of which receive runoff and likely groundwater originating from the pastures.

HDF offers absolutely no analysis of how manure-contaminated water will impact the coastline, the critical habitat designations, or the Class 2 inland water that leads to the Class A marine waters along the Mā‘ili’ulepu coastline. HDF also offers no analysis or explanation for how it will prevent such surface water discharges. It suggests that it will conduct surface water monitoring at various points, but not whether it will take steps to eliminate discharge if manure-related pollutants are detected in the samples.

This is not surprising. Dairies across the United States have been subject to Clean Water Act lawsuits for manure-related discharges into surface waters, which cause a laundry list of negative environmental and health effects. This is especially true when soils contain clay, or are classified as “poorly drained” or unsuitable for receiving large amounts of animal waste by the Natural Resources Conservation Service (“NRCS”). Sloped locations, such as exist on the site, present a high likelihood of irrigation water and/or manure water runoff.

Here, HDF’s site is composed of soils identified as “poorly drained” by NRCS, including Ka‘ema Clay and Kalii Clay soils, which comprise approximately 60% of the

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1 699 animals is no arbitrary number. HDF picked it as a staring point to avoid being labeled as a “large” dairy animal feeding operation under federal law. That threshold is reached when, inter alia, a dairy has 700 mature dairy cows housed on site.
total soil. In fact, according to a NRCS custom soil resource report for the project area, virtually all of the soils underlying the site have “very limited” capacity for disposal of manure through irrigation. “Very limited” soils have “limitations [that] generally cannot be overcome without major soil reclamation, special design, or expensive installation measures...[poor performance and high maintenance can be expected].” HDF ignores this point, insisting that the soils in the facility area are conducive to manure applications, which is simply not true. HDF should be required to conduct a detailed soil survey of the site to evaluate whether manure can be applied to its fields in a manner that is environmentally protective. Based on the NRCS soil survey, this does not appear likely.

Additional soil complications can be traced to the soil’s high susceptibility to surface water runoff. Again, the NRCS states that the various soil types in the project area have anywhere from a “medium” to “very high” likelihood of surface runoff. This means that any excess water left on a field from manure applications and/or irrigation water applications can transport water – and the manure constituents contained therein, including those deposited by the herd within each pen – into surface waters and, from there, into the ocean.

Finally, the topography of the site also presents risks to surface water. Water naturally flows downhill. HDF’s WMP contains a topographical map and narrative explaining how the project site slopes downhill from 150 feet elevation, to 60 feet, to 40 feet, to 15 feet, and finally to sea level. Manure-contaminated water will therefore flow naturally to the low points – the ditches and canals – where it will then follow the predominant surface water flow into the ocean.

Besides runoff from fields to which manure is applied, there is also a distinct concern that precipitation will also convey nutrients from the fields and into surface waters – including the various wetlands located on and around the site. While HDF claims that it will apply manure with an eye toward the weather, as any resident of the area knows, storms can be unpredictable and deposit substantial amounts of rainfall over a very short period. This also applies to HDF’s proposed storage lagoons, divided into a solids settling basin and a storage pond. The setting basin will be full nearly 100% of the time, as it fills up before overflowing into the adjacent liquid storage pond. HDF should be required to explain, in detail, how its lagoons were sized to deal with a 25-year, 24-hour precipitation event in addition to average monthly precipitation depths. For instance, in September 1996, there were six days of continuous rainfall, followed by a week of intermittent rainfall, bookended with another seven days of continuous rainfall. If the dairy were approved and constructed, such a significant rainfall event could cause the lagoons to fail and almost certainly to overflow, releasing substantial amounts of manure that will eventually flow and runoff into surface waters. The EIS should anticipate the environmental and economic impacts of a catastrophic weather event, lagoon breach, or other severe emergency constituting a “worst-case” scenario at the proposed dairy. An extreme storm or earthquake resulting in a major waste discharge or failed lagoon would likely cause irreparable harm to the environment, even if an emergency response is executed. HDF must also address how the expected impacts from climate change will affect precipitation frequency and quantity, including the aforementioned extreme weather events.

HDF must analyze all of these points in its EIS, as well as a careful examination of what problems each manure constituent can create. For instance, excess phosphorus in surface waters can lead to eutrophication; bacterial contaminants such as E-coli and fecal coliform can render surface waters unsuitable for consumption, recreation, and other uses; and nitrogen (in nitrate form) can move into surface waters and, from there, percolate into the underlying aquifer, rendering the groundwater unfit for human use.


Similar to surface water contamination, large dairies in the United States have also been found responsible for contamination of groundwater. Groundwater contamination is especially concerning for this project, as the aquifer in the area provides potable drinking water for the County of Kauai’s Department of Water Supply. In fact, HDF’s WMP does not even identify all of the wells in the project area and provides a skewed picture of how far away those wells are; for instance, while HDF claims that one county well (Koala F) is over a half-mile away, in reality it is only 750 feet from the paddock in which sludge from the settling basin is proposed to be deposited. HDF should be required to undertake an intensive groundwater study to determine the fate and transport of nitrate to the underlying aquifer. Additionally, multiple groundwater monitoring wells should be required to be installed both upgradient and downgradient of the facility to monitor whether the dairy, if approved, is impacting the groundwater. If it is, then the dairy must be required to take remedial action, including possible cessation of operation.

HDF should also be required to evaluate whether it can apply all of the manure generated by its herd on its land at agronomic rates—that is, at the rate in which manure nutrients will be removed by the crop— that will not result in excess nutrients escaping from the property. HDF bills itself as a zero discharge operation but must prove before it starts operation, including an construction activities, that it can live up to that promise. Excess nutrients are likely to be transported deeper into the soil profile with subsequent irrigation, manure application, and precipitation, where they will eventually discharge to groundwater. Along these lines, FOM is very concerned with the estimated nutrient requirements identified by HDF in the WMP. The dairy seems to believe that its grass crop requires in the neighborhood of 750 lbs./ac nitrogen yearly to be sufficiently fertilized. This is an excessively high number, and one that does not appear to be reflected in the literature for Kikuyu grass. If the grass does not use all of the nitrogen supplied by manure applications, then it will lead to contamination of the groundwater.

Additionally, the liner proposed by HDF for its lagoons is inadequate for this area, considering the numerous vital environmental and cultural resources nearby. HDF
indicates it will line its lagoons with a 1.5 mm HDPE lining with 5 mm bidim. FOM does not believe that the liner proposed by HDF will sufficiently stop seepage from the lagoons into groundwater given the concerns with the liner welds and potential punctures from installation and lagoon cleaning. Indeed, after conducting an intensive groundwater monitoring and modeling study, HDF may determine that is simply not feasible to put any type of manure storage lagoon in this area.

Finally, HDF needs to analyze how manure storage and applications will interact with the wetlands on and nearby the project site. It appears that the wetlands and, indeed, much of the project site itself, comprise a large portion of the watershed that feeds the aquifer—an aquifer relied upon for clean, safe drinking water. If manure is not agronomically applied, then excess manure nutrients, including nitrate and phosphorus, will run off into surface waters and leach through the soil and into groundwater. But even if agronomically applied, some manure constituents will wind up in the aquifer. Nitrate, for instance, will move through the soil almost at the speed of water, such that any excess or residual nitrate after manure is applied is likely to leach deeper into the soil and eventually into the aquifer. Once it moves past the crop’s root zones—for Kikuyu grass, this is a very shallow area—the excess nitrate will reach groundwater. It is only a matter of time. The concentration of nitrate in the aquifer may be further impacted by HDF’s proposal to draw 3 million gallons of water per day from Grove Farm wells, as water is drawn for use in the dairy’s daily operations, the concentration of nitrate in the aquifer will increase. An investigation into whether the aquifer can support the proposed use of groundwater for daily operations should be conducted and included in the EIS.

Additionally, the withdrawal of 3 million gallons of water per day from an already-sensitive aquifer presents its own concerns. HDF must analyze whether the significant water drain its proposed dairy will have is sustainable in light of limited supply of fresh water provided by this aquifer.

C. The Proposed Dairy Would Contaminate the Air, Deteriorating the Environment.

The host of environmental concerns presented by dairies as large as the one proposed by HDF does not end with water resources. Large dairies generate significant amounts of hazardous airborne contaminants that can impact air quality, such as ammonia, hydrogen sulfide, mercaptans, particulate matter, and airborne pathogens, to name just a few of the more than 20 hazardous air pollutants (HAPs) emitted by animal feeding operations of the size proposed.3 Ammonia is one of the primary contributors to the degradation of air quality around large dairies. Ammonia is known to cause a variety of health impairments, discussed in greater detail below, which is why it has been designated an extremely hazardous substance by the United States Environmental Protection Agency. Hydrogen sulfide is a similarly designated hazardous substance released by dairies, and can also cause serious health risks, especially for the very young and very old. Recent literature also suggests that dairy-related pathogens have the capability of binding to particulate matter and then moving off-site with wind, where it can cause major health problems in nearby populations. And, of course, nobody enjoys the noxious odors that are created by large dairies. The horrendous smell of HDF’s proposed dairy would leave downwind residents gasping for fresh air.

Air contamination from the dairy will also contribute to climate change. Fossil-fuel consumption and emissions by and from dairy-utilized vehicles, and emissions of greenhouse gases (GHGs) such as methane and nitrous oxide that result from the high number of cows and quantities of stored manure will exacerbate the already-urgent problem of the warming of the planet. The EIS should consider the degree of contribution that HDF’s proposed dairy would have on GHG levels in the atmosphere and climate change.

Because of these (and potentially other) air quality issues, HDF should conduct an extensive air modeling survey to evaluate the impacts its facility will have on nearby residents and tourists. Each contaminant must be carefully analyzed to determine its potential impacts on residents and the environment.

D. The Proposed Dairy Would Harm Threatened, Endangered, and Culturally Significant Species.

Besides degrading various environmental media—the South Shore’s land, air, and water—HDF’s dairy will also result in harm to threatened, endangered, and culturally significant species. Pollution from large dairies like that proposed by HDF has been shown to change and degrade habitat and result in the destruction of other species, through both direct (e.g., contaminated water) and indirect (e.g., species die-off as a result of eutrophication) effects.

Kikuyu grass, slated to be the “primary” food source for the dairy cows, is known to be an extremely aggressive crop, and may crowd out other species. It is considered a weed pest in some areas. See, e.g., http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7458.html. There is a risk that, if not properly managed and contained, the kikuyu grass could spread to neighboring parcels and crowd out native plant species. The EIS should explain how HDF plans to contain this aggressive plant. And although the Kikuyu and Kikuyu-Guinea grasses are slated be the cows’ primary food source, the Kikuyu grass ecosystem presents a risk that diseases and other invasive species will be introduced to the island. HDF should analyze the degree of risk posed to native plant and animal species by its proposed use of Kikuyu grass and other feed material.

Further, the entire coastline where discharges from the proposed dairy will enter the ocean is protected critical habitat. This habitat is home to a variety of native

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3 EPA has identified at least 168 chemical compounds in manure and in the air around livestock operations. In addition to the 20 HAPs, EPA also identified over 160 Volatile Organic Compounds (VOCs). Emissions From Animal Feeding Operations, Draft, U.S. Environmental Protection Agency, Emission Standard Division, Office of Air Quality Planning and Standards, EPA Contract No. 68-D6-0011, August 15, 2001.
HDF must present a detailed analysis evaluating how its dairy could potentially impact all of the species that live in this protected corridor. Special attention should be paid to *Sesbania tomentosa*, commonly referred to as ‘ohai, a type of endemic coast vegetation that is a listed federally endangered species and a State of Hawai‘i Species of Greatest Conservation Need. The critical habitat designation along the Māhā‘ulepu coastal corridor is meant, at least in part, to provide assurance for the continued existence of this species—a continuation that is seriously threatened by the presence of a 2,000 dairy farm upstream. Other federally endangered species that require investigation in the EIS include *Anas wyvilliana* (Hawaiian Duck, Hanama‘ulu); *Branta sandvicensis* (Hawaiian Goose, Nene); *Fulica alai* (Hawaiian Coot); *Gallinula chloropus* sandvicensis (Common Moorhen); and *Himantopus mexicanus knudseni* (Hawaiian Stilt, Ae‘o). This list is not meant to be all-inclusive; it is incumbent upon HDF to conduct a thorough analysis of how its dairy could potentially impact all surrounding species, not just those that are federally endangered.

Similarly, animal waste has been shown to cause localized impacts on ocean acidification, and resulting impacts on wildlife of the broadest spectrum. These impacts must be addressed on their own as well as from cumulative impacts from climate change.

Finally, although the dairy cows themselves are not a protected species, a risk to the health of the herd exists due to the number of cows occupying a small area. As discussed above, it is clear that HDF plans to house up to 2,000 dairy cows in relatively short order. The EIS should include a discussion of potential risks to the health of dairy cows including risks for rapid spread of illness and disease based on the size of the herd and physical confinement or housing.

II. HDF’s Proposed Dairy Would Substantially Affect Economic and Social Welfare.

A. The Proposed Dairy Would Significantly Impact Important Cultural and Historic Sites and Resources.

In traditional Hawaiian culture, natural resources and cultural resources are considered one and the same. A spiritual connection exists between people and their surroundings, including the land, water, and sky. Māhā‘ulepu is a traditional Hawaiian ahupua‘a, or socioeconomic/geologic/climatic subdivision of land, running from the Ha‘upu mountain range to the shoreline on Kaua‘i’s southeast coast. In 2006, the National Parks Service identified certain natural and cultural resources in this area, which hold historical significance for the native Hawaiian population and provide recreational and other enjoyment opportunities for visitors. Those resources include: the undeveloped shoreline corridor from Makawehi northeastward through Māhā‘ulepu and Kipu Hai to Nawiliwili Bay; the Hule‘ia National Wildlife Refuge and historic Alekoko Fishpond along Hule‘ia Stream; and parts of the Ha‘upu mountain range overlooking these areas. NPS Study at 1. Hawaiian burials have been found along coastal sand dunes, and historic petroglyphs occur on Māhā‘ulepu beach and on Grove Farm agricultural lands in Māhā‘ulepu Valley. NPS Study at 38.

An industrial dairy like that proposed by HDF has the potential to significantly disrupt and damage the ability of the Hawaiian population to appreciate and enjoy their traditional cultural resources. Damage due to construction and increased industrial development and traffic, air and water pollution, and potential loss of species in these culturally-significant areas could lead to profound spiritual and emotional harm to those who value these areas for their cultural and historical significance. The EIS should investigate the presence of historical and cultural sites and around the proposed dairy operation and conduct an intensive evaluation of how those sites may be affected; for example, whether and to what extent the ability of individuals to grow or gather traditional plants such as taro would be impaired.


HDF’s industrial-sized dairy may cause additional social impacts to the population at large. Increased noise and traffic during the construction phase and during the dairy’s daily operations will negatively affect quality of life for people living near the dairy and in areas receiving increased dairy-related vehicle traffic. The aesthetic and recreational value of areas in and around Māhā‘ulepu would be diminished by the presence of an industrial dairy, especially from pollution of surface water and coastal waters traditionally used for recreation. The EISPN identifies certain traditional activities which take place along the Māhā‘ulepu coast, including hiking, hunting, fishing, and gathering. EISPN at 3-3. A comprehensive evaluation of potentially-affected recreational activities would also include bird and animal watching, nature walking, wildlife photography and beachfront activities such as surfing, snorkeling, stand-up paddleboarding, and scuba, among others. For example, when water with elevated levels of nitrate and phosphorous reaches the coastal shoreline it will alter the pH, temperature, and chemical makeup of the existing marine water. In turn, coastal marine plant and animal life will suffer. A loss of wildlife and drastic alteration of the makeup of the marine nearshore ecosystems would diminish the enjoyment of individuals who recreate in the Māhā‘ulepu Valley area and along Kaua‘i’s southern coastline, and may cause some of those individuals to cease those activities altogether. The EIS should consider the effects that HDF’s proposal would have on noise levels and visual and recreational interests and in and around the proposed project area.

Finally, the need for employees (both short and long term) to construct and operate the CAPO would have impacts on the regional demographics and related social support services. The EIS should consider the impacts that HDF’s proposed dairy would have on the local population, demographic trends and needs.

C. The Proposed Dairy Would Have Significant Negative Economic Impacts.

HDF’s proposed project would significantly affect the local economy. As the EISPN recognizes, Māhā‘ulepu is located in the Po‘ipū area, which is one of two major tourist and luxury home destinations on Kaua‘i. EISPN at 3-3. Concerns about water and air quality, increased noise, health risks, impacts on native plant and animal species...
be insufficient to meet the dairy’s demand—an evaluation of impacts on Kaua‘i’s utility resources must be undertaken and included in the EIS.

The resident population of Kaua‘i is presently in the range of 63,000-70,000. The approximately 2500 people (EISPN at 3-3) who reside within the Koloa-Po‘ipu Census tract are likely to see their home and property values diminish significantly if a large dairy is operating just a few miles away; property values elsewhere throughout the Mīhā‘ulepu Valley and around Kaua‘i may similarly decline. The EIS should conduct a thorough evaluation of the effects that a 2,000-cow dairy operation will have on land and home values in the area.

The tourism industry on Kaua‘i will also be greatly affected by the presence of a large dairy. Area resorts, hotels, and independent vacation rentals, as well as the recreational facilities, shops, and restaurants that cater to visiting tourists, are all likely to experience a decline in visitors—and consequently, income—if the desirability of the Po‘ipu area and Mīhā‘ulepu Valley as a vacation and recreation destination is diminished. The 2008 NPS Study estimated that, at that time, Kaua‘i experienced a daily visitor population of about 21,000 tourists. Those visitors infuse money into the local economy by renting hotel rooms and vacation properties, buying meals and souvenirs, and purchasing recreational experiences, such as a sightseeing tour or surf or paddleboard class. Visitors to Kaua‘i also frequently arrive by boat, with both local and international cruise lines including the port of Nawiliw, among others, as a sailing destination. Itineraries including ports of call on Kaua‘i would likely lose some of their attractiveness when it becomes known, through sites, smells and other impacts, that an industrial dairy is operating mere miles from one of the island’s major resort areas.

Regardless of the method of travel, some tourists will be reluctant to visit a destination—presently known for being the lush and verdant “Garden Island”—on which a large, industrial dairy operates, and the EIS should thoroughly evaluate the ways in which the HDF project would affect the thriving tourism industry.

D. The Proposed Dairy Raises Infrastructure Concerns

HDF’s proposed dairy will require substantial energy consumption, both during construction and daily operations. The EISPN indicates that some electrical power will be generated through the use of rooftop photovoltaic panels, but provides no information about the estimated number of panels or what the expected kilowatt output of those panels will be. The EIS should include a detailed analysis of the proposed dairy’s electricity demands and a realistic estimate of any on-site electricity generation. Because on-site power generation will not be available until the photovoltaic panels are installed and functional—or in the event that HDF determines that on-site power generation will be insufficient to meet the dairy’s demand—an evaluation of impacts on Kaua‘i’s utility resources must be undertaken and included in the EIS.

The EIS also should include a thorough characterization of the site and evaluate whether any historic uses (legal/formally recognized or otherwise) render the site inappropriate for a dairy operation. For example, the EIS should investigate whether and to what extent the site may have been used as a landfill or for waste disposal, and whether any hazardous or solid wastes remain on the property. If HDF determines that solid or hazardous wastes are present, it may reconsider the suitability of this location for milk production.

III. HDF’s Proposed Dairy Would Substantially Affect Public Health

HDF’s proposed project raises multiple public health concerns that must be thoroughly researched and carefully considered. While the examples below are not meant to be an exhaustive list, at minimum, the EIS should include an in-depth investigation of the risks posed to public health by virtue of the proposed dairy’s potential contamination of water and air, and the potential that the dairy will serve as a source of vectors for disease transmission.

A. Groundwater and Surface Water Contamination Resulting from HDF’s Proposed Dairy Would Threaten Public Health

Nitrate found in drinking water sources presents risks to human health. In recognition of these risks, the EPA has established the Maxium Contaminant Level (MCL) of nitrate at 10 mg/L. See http://water.epa.gov/drink/contaminants/basicinformation/nitrate.cfm. Infants, pregnant women, the elderly, and persons with compromised immune systems are particularly vulnerable to harmful health consequences of consuming water with elevated levels of nitrate. Infants below the age of six months who consume water with elevated levels of nitrate may experience shortness of breath and become seriously ill, and if untreated, may die. Id. Maternal exposure to environmental nitrate may increase the risk of pregnancy complications, such as anemia and preeclampsia. See, e.g., U.S. Department of Health & Human Services, Agency for Toxic Substances and Disease Registry, “ATSDR Case Studies in Environmental Medicine Nitrate/Nitrite Toxicity,” at 53 (Dec. 5, 2013). Epidemiologic studies of adverse health outcomes and high nitrate levels in drinking water have reported an increased risk of hyperthyroidism from long-term exposure to nitrate levels above the MCL, specifically between 11 mg/L and 61 mg/L. Burkholder, J. et al. “Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality,” Environ. Health Persp. Vol. 115, No. 2 pp. 308-312 (Feb. 2007).

Further, even nitrate levels below the MCL of 10 mg/L may be cause for concern; nitrate at levels less than 10 mg/L has been associated with insulin-dependent diabetes, and increased risk for adverse reproductive outcomes, including central nervous system malformations and neural tube defects, have been reported for drinking water nitrate levels less than 10 mg/L. Accordingly, some public health experts believe that the MCL
for nitrate is set too high to effectively protect human health from known or anticipated adverse health effects. As discussed above, the potential for land-applied and stored manure to result in elevated levels of nitrate in groundwater is high. Potential mitigation through the use of reverse osmosis systems or other filtration may ameliorate the risk to a certain degree, but even those systems are not necessarily effective: they must be maintained properly to provide protection to the residents of the home, and there is evidence that high levels of nitrates may not be fully removed by reverse osmosis systems. See, e.g., J. Schoeman, “Nitrate-nitrogen removal with small-scale reverse osmosis, electrodialysis and ion-exchange units in rural areas,” Water SA, Vol. 35 No. 5 (Oct. 2009). Furthermore, reverse osmosis systems deplete natural minerals from water that can cause the filtered water to damage existing plumbing systems and strip important micronutrients from the human body.

Industrial dairies like that proposed by HDF also present public health concerns due to the risk of surface water contamination to river and stream ecosystems. Increased amounts of phosphorus and nitrogen in surface waters—resulting from agricultural runoff—may lead to large algal blooms, which cause a variety of illnesses in humans. See, e.g., http://www.cdph.ca.gov/healthinfo/environhealth/water/pages/bluegreenalgae.aspx. Risks to the public may occur when individuals are recreating in water in which an algal bloom is present, or from drinking water sourced from surface water in which an algal bloom is present. Id. Certain strains of algae, such as blue-green algae, produce neurotoxins, which are highly dangerous to humans and other species. Microorganisms in animal waste, such as E.coli and enterococcus, are also frequently present in dairy-derived agricultural runoff to surface waters and pose a threat to human health when ingested. Any veterinary pharmaceuticals or antibiotics used by the dairy will likely wind up in downstream and downgradient water sources. These pharmaceuticals and antibiotics, on their own, may present a health risk to humans and other species, but may also contribute to increased numbers of antibiotic-resistant bacteria, which are of particular concern to humans.

B. Air Contamination Resulting from HDF’s Proposed Dairy Threatens Public Health

Second, industrial dairies like HDF’s proposed dairy also present multiple air quality concerns. As discussed above, stored manure emits major pollutants, including hydrogen sulfide, ammonia, airborne pathogens, and particulate matter. Exposure to ammonia can irritate the eyes, skin, and respiratory system, causing bronchial swelling or even tracheal/upper respiratory burns. The threat posed by exposure to ammonia is not taken lightly; in fact, if a dairy releases more than 100 lbs. of ammonia into the air on a daily basis, then it is required to report its releases under the federal Emergency Planning and Community-Right-to-Know Act (“EPCRA”), 42 U.S.C. § 11001 et seq. Exposure to hydrogen sulfide causes skin and eye irritation, and exposure in high levels may lead to even more severe health effects such as seizures, comas, and death. Releases of hydrogen sulfide are thus also required under EPCRA.

In addition to harmful air pollutants, the handling and disposal of manure and production of animal feed at industrial dairies creates airborne particles and dust, which may cause or exacerbate respiratory conditions such as asthma and bronchitis. While the airborne particles themselves pose a problem when they lodge in people’s lungs and respiratory tracts, they may also serve as a mechanism for the transfer of airborne pathogens. Employees and individuals who reside near or frequently visit areas near the dairy are especially susceptible to harmful health impacts from chronic exposure to air with high concentrations pollutants and particulate matter.

Harmful air pollution may also result from the carbon emissions generated by HDF’s operational vehicles. The transportation of thousands of gallons of milk (either to other Hawaiian islands or to the contiguous United States) for processing on a regular basis is certain to contribute to an increase in emissions of volatile organic compounds (VOCs) and other toxic pollutants resulting from frequent truck and tanker trips to and from the dairy. In addition to the health risks posed by the inhalation of polluted air, toxic air pollutants can be deposited onto soil and water, where they may bioaccumulate in plants or animals that are later consumed by humans as food.

C. HDF’s Proposed Dairy Threatens Public Health Because it Increases the Risk of Disease Transmission

Third, HDF’s proposed dairy poses a public health risk as a means of disease transmission. The dense concentration of livestock would result in proliferating populations of rats, mosquitos, flies, and other pests. A surge in rodent an insect populations presents at least two major problems: first, swarming and biting flies and insects create a nuisance for swimmers, beachgoers, and other residents and tourists who wish to spend time in outdoor areas. Second, and more troubling, rats, flies, and mosquitos are vectors for disease transmission, and an increase in the populations of these animals increases the risk of transmission to humans. For example, the bacteria leptospirosis, already a recognized problem in freshwater streams and rivers on Kaua‘i, is transmitted in the urine of infected animals; rodents and livestock are typical vectors. http://health.hawaii.gov/about/files/2013/06/leptobrochure.pdf. The livestock crowding at HDF’s dairy, combined with the siting of the industrial dairy in a location with freshwater streams present increases the risk of transmission of leptospirosis and other diseases.

The potential public health threats identified above are just some examples of the types of public health risks that should be thoroughly discussed in the EIS and seriously considered by the approving agencies. To the extent that state waste management guidelines or other state laws or regulations require a plan for pest management, HDF should complete such a plan and include it in its EIS.

CONCLUSION

After HDF has an opportunity to take a hard look at all of the negative consequences of its proposed dairy, FOM believes it should abandon this ill-advised
May 26, 2016

Law Offices of Charles M. Tebbutt, P.C.
941 Lawrence Street
Eugene, OR 97401
Charlie@tebbuttlaw.com

Subject: Hawai‘i Dairy Farms Environmental Impact Statement (EIS) Preparation Notice Māhā‘ulepū, Kōloa District, Kaua‘i, Hawai‘i Response to Friends of Māhā‘ulepū Comments

Dear Mr. Tebbutt:

Thank you for the input dated February 23, 2015 representing Friends of Māhā‘ulepū’s comments on the Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice (EISPN). We acknowledge your comments about the project, and offer the following responses.

HDF will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as fertilizer for pasture grass to provide the primary source of nutrients. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will provide a local food source appropriate for cow health and quality milk production, and will comprise at least 70 percent of the animals’ diet.

As you are aware, Hawai‘i Dairy Farms (HDF) stepped forward in response to community concerns about the dairy for the Po‘ipū area and offered to prepare a comprehensive Environmental Impact Statement (EIS) for the proposed project. It is the purpose of Hawai‘i’s environmental law, known as HRS Chapter 343 and “HEPA”, to “establish a system of environmental review which will ensure that environmental concerns are given appropriate consideration in decision making along with economic and technical considerations.” The HEPA process includes scoping discussions with regulatory agencies and the community to identify issues of concern. HDF engaged technical consultants to analyze probable impacts on environmental and societal conditions. Relevant local, state and federal ordinances, statutes, and regulations were considered. We believe the EIS demonstrates that this innovative dairy system will benefit the local and statewide community by advancing food sustainability.

HDF is committed to establishing a herd of up to 699 mature dairy cows, and demonstrating the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help

Sincerely,

[Signature]

Charles M. Tebbutt
Law Offices of Charles M. Tebbutt, P.C.
determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. The application process for a National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) permit includes public notification and input. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is currently estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

I. Environmental Contamination

The Nutrient Balance Analysis appended to the EIS documents calculations of manure output by dairy cows, using the Cornell Net Carbohydrate Protein System model. Estimates generated by the model were compared the USDA/NRCS Agricultural Waste Management Field Handbook (March 2008), which utilizes established American Society of Agricultural Engineers values.

The manure production of the size dairy cow HDF will use is 10.9 gallons per day, which equates to 0.68 gallon average per waking hour. Cows are awake approximately 16 hours per day, with 2 hours spent moving through the holding yard and milking parlor in two separate 1-hour periods. The effluent ponds will capture the portion of manure excreted during the two, 1-hour periods each day when cows move through the holding yard and milking parlor. Manure is washed from the facilities using potable water to maintain sanitation per milk rules, and is routed to the settling and storage ponds. Washwater adds approximately 17.4 gallons of water per cow per day. See Chapter 3 and Appendix D of the EIS.

The manure with washwater for the committed herd size of 699 mature dairy cows is estimated to total 13,325 gallons per day (gpd) (0.013 million gallons per day [MGD]). The quantity includes the minimal input from calves within the calf sheds. For the contemplated herd size, the total projected volume to the effluent ponds would be 17,995 gallons per day (0.018 MGD). In comparison, an estimated 1.17 MGD of wastewater disposal was processed at treatment plants in the South Kaua’i area in 2010; which is estimated to increase to 2.42 MGD by 2035. See EIS Section 4.20 for additional information.

Surface Water

HDF will utilize best management practices to minimize impacts to waterways. Perimeter fencing to exclude cows from surface waters will provide a 35-foot setback on each side of the drainageways. Vegetative buffers will be maintained within the 35-foot setback to act as filter strips to settle out any particles carried in stormwater. The setback for effluent application is 50 feet from each side of drainageways. Additional stormwater controls to be implemented over the long-term include structural controls, are discussed in Section 4.17.4. Over the long-term, the surface water quality in the agricultural ditches and Waiopili Ditch will be improved by active management of the dairy site. Cultivation of a grass thatch for complete vegetative cover throughout the dairy paddocks will minimize currently exposed soils within the site.

State of Hawai’i Water Quality Standards Classification

Per Hawai’i Administrative Rules (HAR) §11-54, Water Quality Standards, §11-54-5.1 Inland water areas to be protected, and §11-54-6 Uses and specific criteria applicable to marine waters, all waters to be protected are listed in Appendices A, B, and C (dated July 1, 2014) of the HAR. No inland waters in the Māhā‘ulepū watershed are included in the HAR §11-54 Appendix A. Therefore, no Class 1 or Class 2 Inland Waters exist in or around the HDF site. Marine waters downslope from the HDF site fall into open coastal waters Class A, as no embayments, marine waters, or open coastal waters in the area are included in the appendices of HAR §11-54 for special protection.

After dairy establishment and when cows are on pasture, periodic sampling will enable comparison of nutrient levels to ensure nutrient balance objectives are met (see Draft EIS Section 3.3).

Nearshore Marine Water Quality

An assessment of groundwater and surface water interaction with the marine water downslope from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Analysis of chemical and physical properties of groundwater and nearshore marine water quality shows virtually no groundwater influence. Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore.

Surface water is estimated to carry three times more nutrients than groundwater moving through the alluvium on the valley floor (see following discussion, Groundwater). The groundwatershed and surface water analysis (Appendix E) estimates two percent of total nitrogen and one percent of phosphorus could potentially pass through the alluvium; however, the alluvium, groundwater flow would be modest. However, the groundwater level in the alluvium is approximately 80 feet above mean sea level near the HDF monitoring wells 1 and 2. The groundwater can rise in wetter periods and intersect the deep drainage ditches. Episodic, seasonal events will result in a modest amount of discharge from groundwater into the surface channel.

Applying the estimates of nutrient pass-through to the HDF operational nutrient mass balance, two percent of nitrogen pass through would total 10,000 pounds per year, and one percent of phosphorus pass through would total 900 pounds per year. Note that nutrient release from the dairy site would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major
rainfall and storm water events. Per best practices, no effluent application would be conducted during such weather events.

It is estimated that actual runoff into drainageways from HDF pasture will only occur when rainfall exceeds 0.8 inches. Based on the 30-year daily rainfall record for the area, such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. The surface water quality and marine assessment concludes there will be no adverse effect on nearshore waters from dairy operations.

The EIS section documenting potential cumulative impacts (Section 4.20.1, Interrelationships and Cumulative Environmental Impacts), provides a comparison of nutrient inputs from the adjacent Kāloa-Pōʻīpū region. Nitrogen additions to the near-term marine environment along the Pōʻīpū coastline are estimated at 38,510 pounds per year from domestic wastewater and landscape fertilization, equaling to 3.5 times greater than the potential contribution from HDF; phosphorus of 1,260 pounds per year is calculated and is 1.4 times greater than the potential contribution from HDF.

HDF has initiated a long-term ocean water quality monitoring program in conjunction with groundwater and surface water quality monitoring, to regularly sample and analyze nutrient and chemical constituent levels in the nearshore marine waters. The ongoing testing program will provide feedback to the dairy management team regarding changes in water quality. Data from the nearshore water monitoring program will be shared with the DOH-CWB, dairy neighbors and the local Kauaʻi community.

Soils

As a part of the DEIS, existing soil conditions of the project site were evaluated, along with potential impacts on soil conditions due to the proposed Dairy Farm project. EIS Section 4.3 provides an evaluation of soil conditions, and includes the soils and agronomy analysis prepared by Russell Yost and Nicholas Krueger, U.H. Mānoa, as Appendix C.

NRCS maps show the most abundant soil types occurring throughout the HDF site are Kālihi Clay and Kaʻena Clay Brown Variant. These soils underlay 32 percent and 29 percent of the dairy project area, respectively. The Kalihi series is described as “poorly drained” soils that developed in alluvium derived from basaltic igneous rock. The Kaʻena series is described as a very deep soil, also as poorly drained, and is primarily located on alluvial fans and talus slopes on both Oʻahu and Kauaʻi.

The classification of soils as poorly drained indicates the relatively slow rate of water movement within soil and to surrounding areas. Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas “drainage” refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity.

Soils classified as poorly drained often exhibit anaerobic conditions. Anaerobic conditions typically result in higher rates of denitrification, which is the conversion of potentially environmentally hazardous nitrate and nitrite to gaseous forms. This essentially reduces the potential for nitrate impacts on nearby waterbodies. With reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. In this way “poorly drained” soils may represent less risk of nitrate and nitrite harm to associated water bodies than “well drained” soils. The soils and agronomy report confirms the soils are suitable for nutrient application.

The NRCS Nutrient Management Standard provides a phosphorus leaching index for Kauaʻi soils. The teaching potential for each soil type at HDF is low, with an index value of 10 to 18 which is well below the upper index value of 30 still considered low. The moderate index ranges from 30 to 90, and the high index is for values above 90. Under the NRCS Nutrient Management Standard, on low risk soils, phosphorus can be applied at rates greater than crop requirements, not to exceed the nitrogen requirement for the succeeding crop, if manure or other organic materials are used to supply nutrients. Since the grass crop is not newly planted for each rotation and the growing season is constant and year-round, the phosphorus application is planned to be managed and adjusted to not exceed the crop requirement rate.

Restoring nutrients to the depleted soils is the first step to improving soil health. Nutrients beyond the crop demand will be taken up by the soils, and will begin to rebuild levels available for plants. The dairy's focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons.

Effluent Ponds

For the committed herd size of 699 mature dairy cows, the storage pond could accommodate nearly one million gallons more than the NRCS design requirements (EIS Section 3.3.2; Figure 3.3-6). In normal operations, the storage pond provides additional spare volume at the top of the pond. In the 699-cow scenario, the spare volume is an additional 45 percent of the total volume design. In the 2,000-cow scenario, the spare volume represents an additional buffer of up to 12 percent.

Nevertheless, the storage pond design incorporates an emergency spillway to direct overflow to a secondary containment area in case of a catastrophic event. This
containment is beyond the regulatory requirement, and would only be utilized during an unprecedented rain or flood event. The capacity of the secondary containment is approximately 1,125,600 gallons, which is roughly equivalent to the total wastewater volume for a 30-day period from the potential contemplated herd size of up to 2,000 mature dairy cows. The design capacity of the ponds exceeds regulatory requirements, and would provide containment in excess of any major rainfall event recorded in the valley over the past three decades.

Details of effluent pond design, effluent application, and additional design safeguards are presented in Appendix D, Nutrient Balance Analysis.

**Groundwater Findings**

Four new onsite wells were installed by HDF to access groundwater in the alluvium to facilitate an analysis of hydrologic connectivity and to establish baseline water quality conditions. As part of the groundwater assessment conducted by Tom Nance Water Resource Engineering (TNWRE), pump tests were conducted to determine whether there is any relationship between two groundwater bodies in the area: in the shallow alluvium of the valley floor; and the aquifer in the deep unweathered volcanic series. The assessment determined there is no hydrologic connection (see additional detail in the Draft EIS Section 4.16.1).

The groundwater and surface water analysis determined that the modest potable water use rate for dairy operations, and the 4,500-foot distance between the Māhā`ulepū 14 well and the nearest County potable water well (Kōloa Well F), will result in no adverse impacts to ongoing use of groundwater in the unweathered volcanic series, which is the source of potable water. Further, the assessment determined there is no hydrologic connection between the aquifer in the unweathered volcanic series, the source of potable water, and the shallow groundwater body in the alluvium. Thus nutrients added by the dairy operation will have no impacts to the County drinking water well, the source of potable water within the deep volcanics.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow waterbodies in the Māhā`ulepū Valley alluvial material, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Four water monitoring wells installed by HDF into the shallow water aquifer within the alluvium will allow monitoring of water quality. Results from the monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua`i community.

**Agronomic Nutrient Demand**

Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The NRCS Conservation Practice Standard 590 (referred to as Standard 590), Nutrient Management, is applied to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. The timing and application of nutrients should correspond as closely as practical with plant uptake, soil properties and weather conditions.

A Technical Service Provider knowledgeable in NRCS Conservation Practices was retained to work with HDF technical advisors in determining a nutrient balance for the Māhā`ulepū site. Application of manure can be beneficial to soils by improving organic matter, increasing infiltration of water, and improving the soils’ ability to support pasture growth and root establishment.

As the cattle excrete on the Kikuyu thatch, nutrients are incorporated into what is effectively an organic net. Healthy soils contain primary decomposers such as earthworms and dung beetles that move manure into the soil profile when they burrow, aerating the soil to make organic materials accessible to secondary decomposers. Secondary decomposers include microbes (microorganisms) such as bacteria, protozoa, and fungi. The decomposition process breaks down manure into nutrient components that are readily available for uptake by the grass crop. In a healthy system, a manure pile can be removed from the soil surface within 24 hours. Even with the applied manure and effluent nutrients, the grass will need significant additional nutrients from conventional fertilizers to maintain optimum grass growth and yield goals with 699 mature dairy cows.

The contemplated herd size of 699 mature dairy cows would produce manure both within paddocks and in the milking parlor, providing additional organic nutrients and reducing the requirement of supplemental commercial fertilizer. EIS Chapter 3, Section 3.5 identifies the nutrient demand of the pasture crop across the 470 acres of grazed pasture, and applies the nutrients available from the committed herd size of 699 mature dairy cows to determine the remaining nutrients required from commercial fertilizers. Approximately 30 percent of the nitrogen and 76 percent of the phosphorus required annually would come from the committed herd size, requiring nearly 70 percent of nitrogen and 64 percent of phosphorus to come from commercial sources (see EIS Section 3.5, Table 3.5-1).

As a conservative estimate, the nutrient mass balance for the contemplated herd size assumes the grass yields do not increase. As shown in the EIS Section 3.8, the percentage of nitrogen provided by animals is 88.3 percent, an increase of 57.8 percent over the amount provided by the committed herd size to a total of 88 percent of the crop demand (shown in Table 3.8-1). The percentage of phosphorus increases by 68.4 percent from the amount provided by the committed herd size, to provide approximately 104 percent of the plant requirements. Several management options exist to keep phosphorus and other nutrients in balance, which may include and are not limited to: improved soil health from initial additions of phosphorus, reduction in contemplated herd size to approximately 1,875 mature dairy cows, or the expected increase in the grass yields from 16.3 tons of DM per acre per year to 20 tons of DM per acre per year (through an increase to 17.3 tons of DM per acre per year would be sufficient to bring phosphorus applications back into balance with crop demand and eliminate any phosphorus overage). Higher
grass yields would demand additional phosphorus. Nitrogen from commercial fertilizer would be required at both 1,875 and 2,000 mature dairy cows.

It should be noted and planned that the commercial fertilizer requirements to maintain high forage productivity and soil health can exceed the simple arithmetic difference between the nutrients applied by manure and the forage uptake. Rather, these values only represent the net amount of nutrients that need to be provided to and utilized by the crop through commercial fertilization, beyond the nutrient that is available to the crop from manure sources. Fertilization, especially the application of commercial nitrogen, can be inefficient with actual requirements with respect to forage production, and fertilization needs can be as much as 25 to 50 percent greater than the arithmetic difference resulting from a mass balance calculation - due to volatilization or soil sorption as mentioned above. Refer to the soils and agronomy analysis prepared by Russell Yost and Nicholas Kruenger, University of Hawai‘i at Mānoa College of Tropical Agriculture and Human Resources (CTAHR), EIS Appendix C.

**Pond Siting, Lining and Water Resources**

Refer to previous heading: Effluent Ponds, for additional information on pond capacity.

The pasture-based system utilizes manure as a valuable resource. This is a fundamental difference and advantage over conventional feedlot dairy operations, which have insufficient land to recyle the nutrients for uptake by forage plants and instead rely on imported feed and large storage lagoons to hold manure. The pasture-based dairy relies on 100 percent of the nutrients from manure deposited on the pasture, with application of manure captured in the effluent ponds, to grow the majority of forage for the herd.

Siting, design and construction of the ponds will be in compliance with the local land grant college guidelines and technical guidance from NRCS. Animal waste storage facilities should provide a minimum buffer of 1,000 feet from public drinking water resources, and 50-feet from surface water resources. The HDF facility sites the ponds approximately 125 feet from the nearest drainage ditch, and 3,420 feet from the nearest public drinking water well (see EIS Chapter 3, Section 3.2.1). Though the waterbody in which the County public wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley alluvial material, HDF agreed to establish a 1,000-foot setback surrounding the Kōloa F well with the County Department of Water. Within this setback, no effluent or commercial fertilizer will be applied, and no animals will be grazed.

Though not required by guidelines, HDF has elected to line the ponds to protect against seepage into surrounding soil. A synthetic liner will meet the standards of the NRCS Conservation Practice Code, and will be underlain with a sensor system that can detect moisture and alert personnel to potential leaks. Inlets, outlets, ramps and other elements of the effluent transfer system will be installed according to NRCS practices to prevent damage to the operation of the liner.

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**Air Quality**

The HDF rotational-grazing pasture based system is fundamentally different than a conventional feedlot dairy. The rotational-grazing pasture based system utilizes 100 percent of manure on site as nutrients for forage crops. The effluent ponds differ from storage lagoons as effluent is cycled through on a regular basis and applied the fields, typically in conjunction with irrigation. Irrigation timing and amount is based on soil moisture and precipitation, but the typical application schedule is anticipated to be every 4 days. The liquid effluent utilized by either of the two irrigation pivots is well above the daily effluent generation from both the committed herd size and the contemplated herd size of up to 2,000 mature dairy cows (see EIS Appendix D, Section 8.4).

Manure in the effluent storage ponds have a short residence time and will not be covered. Therefore, HDF will not create a contained source of gases that could be released inadvertently.

No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist. However, livestock and agriculture as an industry contributes to greenhouse gas emissions. During the public scoping period, inquiries about the project’s potential contribution to greenhouse gas were received. As the dairy has not been established, published scientific models were applied to calculate probable emissions from the pasture-based dairy operations. Results are presented here, and the probable impacts assessed.

Estimates of GHG emission rates from a pasture-based dairy were calculated using the Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories. Parameters for dairy cattle in Oceanic (warm) climates were selected as most applicable to conditions at HDF. Estimated emissions of methane and nitrous were converted to carbon dioxide equivalents (CO₂e) using the IPCC’s AR3 global warming potential (GWP) that relates the GHG to CO₂.

Long-term operational impacts were modeled using the IPCC guidelines and conversions, and estimated the emissions potential for GHG at the dairy at the committed herd size of 699 milking cows to be 2,693 CO₂e metric tons per year (2,969 US tons). This is equivalent to the GHG generated by 170 4-person households, including home energy consumption, transportation and waste. For the contemplated herd size of up to 2,000 milking cows, the total GHG is estimated at 7,705 CO₂e metric tons per year (8,493 US tons). This is equivalent to the GHG generated by 485 4-person households, including home energy consumption, transportation and waste. See EIS Chapter 4, Sections 4.19.3 and 4.25.3, and the air quality report in Appendix I. GHG impacts from the HDF operation will be somewhat offset by additional carbon sequestration from the atmosphere (refer to Soils, previous). The potential net impact would not be significant and would not affect global climate change.
Operational practices to protect air quality by reducing nitrogen emissions will come from guidance in NRCS Conservation Practice Standard 590. Nutrient Management. Application of nutrients must be adjusted to minimize negative impacts of GHG release to the environment through adjustments to the source, timing, amounts, and placement of nutrients. Specific practices to be utilized at HDF include: slow release fertilizers; nutrient enhancement technologies; and stabilized nitrogen fertilizers.

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylote” of confined dairy operations where animals walk over dirt and dried manure throughout the day. Using emission rates from the published literature therefore greatly overestimates potential emission from HDF, as cows in a rotational-grazing pasture system will spend only two hours each day moving along cow walkways.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM$_{10}$ and PM$_{2.5}$) measured on the island of O‘ahu. This was considered the total impact and was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 milking cows was modeled, as at the lower threshold of 699 cows the potential fugitive dust impact would be negligible.

The estimated concentration for PM$_{10}$ is 2.01 μg/m$^3$ per 24-hour period, which is well below the State standard of 150 μg/m$^3$. The estimated concentration for PM$_{2.5}$ is 0.21 μg/m$^3$ per 24-hour period, which is well below the Federal standard of 35 μg/m$^3$.

The total annual particulate matter emissions were also estimated for PM and greenhouse gases (GHGs). Total annual emissions (in tons per year) are typically estimated for potential permitting applicability. Results of the estimate for a herd size of 699 mature dairy cows for PM was 0.6 tons per year, and 3.3 tons per year for a potential future contemplated herd size of up to 2,000 mature dairy cows. The project will not require any permits under the Clean Air Act, or State of Hawai‘i counterpart.

Estimates of GHG emission rates from a pasture-based dairy were calculated using the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories. Parameters for Oceanic dairy cattle in warm climates were selected as most applicable to conditions at HDF. Long-term operational impacts were modeled using the IPCC guidelines and conversions, and estimated the emissions potential for GHG at the dairy at the committed herd size of 699 milking cows to be 2,093 CO2e metric tons per year. This is equivalent to the GHG generated by 170 4-person households, including home energy consumption, transportation and waste. For the contemplated herd size of up to 2,000 mature dairy cows, the estimated total was 7,702 CO2e metric tons per year (8,490 tons) is equivalent to the GHG generated by 485 4-person households, including home energy consumption, transportation and waste. EIS Sections 4.19 and 4.26 address the potential for greenhouse gas emissions by HDF.

While the presence of cows may increase GHG, a long-term beneficial impact of the grazing fields is the sequestration of carbon as CO$_2$ captured by the process of photosynthesis by the grass. According to recent studies in the Soil Science Society of America Journal, converting formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, which enhances soil quality, grass production, and has the potential to offset up to one-third the annual increase in CO$_2$ production of an area.

Threatened / Endangered Species

A botanical survey conducted for the EIS describes vegetation on the HDF site as typical of regularly disturbed land. The land has been under extensive cultivation for decades; no native plant habitats exist on site. Kikuyu grass was introduced to Hawai‘i in 1925 and is one of the most important pasture and range grasses in the State. Cultivation of pasture grasses at the HDF site will not extend the range of introduced grasses in the area. Activities at HDF will not impact any areas dominated by native vegetation offsite, either upper elevation forests or coastal strand vegetation. The EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with the technical report contained in Appendix A.

The botanical survey of the dairy property conducted in August 2014 by AECOS Consulting assessed existing plant species. The survey described that the present and historical uses of the area for intensive agriculture very much limit the natural botanical resources anticipated to occur. In all, 115 species of plants were identified within the surveyed area. Only five of these species (or 4.3 percent) are native to Hawai‘i, and all of those are considered indigenous (found in Hawai‘i and other Pacific Islands, as opposed to endemic species that are unique to the Hawaiian Islands). The remaining 110 species identified are introduced plants that have become naturalized, with the exception of one introduced plant that is regarded as an ornamental plant. Complete species lists are included in the EIS, and no rare or protected botanical species, or intact native plant communities, occur on the project site. No long-term impacts to native plant habitats or endangered or threatened plant species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. The survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhā‘ulepū Valley.
Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site, though the area does not provide critical habitat. Nēnē, the native Hawaiian goose, was also seen on the site, and DOFAW biologists have noted they are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kōloa area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to these four waterbird species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to project specified areas, marking tall structures and fencing with white visibility polytape, limiting nighttime lighting, and shading any outside lights used at night. Ongoing mitigation strategies will be implemented for day to day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is not expected that the dairy farm will not affect this listed mammalian species.

A study of invertebrate species and pest insects was conducted in January 2016 by Steven Lee Montgomery, PhD, Consulting Biologist. There are no known caves or lava tubes found at or adjacent to the dairy farm property. The Kōloa Lava Tube System, which provides habitat for two endemic cave species, the Kaua’i Cave Wolf Spider and the Kaua’i Cave amphipod, is located several miles away from the dairy farm property. Both invertebrates are listed as endangered under the U.S. Endangered Species Act. Not all caves in the Kōloa area contain these invertebrates, as most caves in the Kōloa District do not contain the optimal climatological conditions required by these organisms. Neither the botanical and faunal survey nor the invertebrate survey revealed any evidence of lava tubes or caves on the property, and no such features have been reported for the area in the near surrounds of the HDF site. Thus no cave invertebrate species will be affected by the dairy farm.

II. Economic and Social Welfare

The Hawai‘i Dairy Farms project is subject to an historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 66 and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project.

The archaeological survey included an area to 1,000 meters north of the HDF site northern boundary, at the request of SHPD. Ten sites of the total 16 identified occur in the extended survey area. The 6 sites identified within the project area consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century, all of which are affiliated with sugarcane cultivation. The sites within the project area associated with Plantation-era sugarcane cultivation will not be adversely affected by the proposed project. Most are in fair to good condition, and will likely be adaptive for re-use, such as bridges and culverts. The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. No long-term impacts are anticipated, and no further mitigation is recommended for the project area.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhāulepū Ahupua‘a, has been and is currently used for traditional cultural practices. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be adversely impacted by establishment of the dairy.

Social Impacts

The potential impacts of Hawai‘i Dairy Farms to the existing economy were evaluated in the EIS, including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The Hawai‘i Dairy Farms project would create short-term benefits through jobs for local construction personnel and local material suppliers. Construction employment would be expected to average about 12 jobs per year during the development period. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Thus direct-plus-indirect employment association with Dairy development would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

Hawai‘i Dairy Farms would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Big Island), less than 10 percent of Hawai‘i’s milk is locally supplied. Hawai‘i Dairy Farms, with an established herd of up to 699 milking cows, will increase the supply of local fluid milk by approximately 1.5 million
$1,297,150 for a lot, to $2,893,100 for a lot with home. Clearly, beef cattle operations are compatible with nearby homes, commercial areas, resorts and recreational areas. Although stocking densities are lower for beef cattle on unirrigated pastures than for the proposed dairy on irrigated pastures, the operations are similar: cattle are rotated among pastures as limited by the carrying capacity of the land.

Results of technical studies and the findings of the EIS show no unmitigated nuisances that would affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will reach resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area. The dairy will help maintain the existing rural character and ambience of the Kōloa-Poipū region.

**Noise**

Existing noise conditions of the project site and surrounding Māhāulepū Valley area are evaluated in the EIS, along with anticipated short-term and long-term noise conditions associated with the dairy farm and planned mitigation actions. EIS Section 4.12 addresses noise conditions.

Noise can be defined as unwanted sound, a sound that is considered loud or unpleasant, and/or sound that causes disturbance. Research related to noise and livestock focuses on noise levels and minimization of unexpected sounds that stress caused to cows. Noise stress results in loss of livestock productivity and thereby financial loss to farmers and ranchers. Little research exists on the sound levels from livestock.

Sound is measured in decibels (dB). The State of Hawai‘i Department of Health rules use the A-weighting sound network (dBA) in the HAR §11-46, Community Noise Control. Sound through the air is similar to ripples on a pond of water. In open space without reflection, ripples spread uniformly in all directions and decrease in amplitude further from the source. In free field conditions such as outdoors, amplitude drops by half as distance doubles, which is a drop of 6 dBA (OSHA, 2016). When sound passes close to absorbing ground cover such as grassland and fields, the “soft ground” absorbs extra sound as it passes. The HDF site in Māhāulepū Valley is 2.5 miles from the resort area, and 1.5 miles from the closest residential areas (on land zoned for agriculture). Typical noise currently generated near the HDF site includes truck ingress/egress along private farm roads, agricultural equipment, and cattle and sheep.

The dairy farm will utilize milking equipment contained in the milking parlor, and will use field equipment such as tractors. Under HAR §11-46, agriculture is classified as Zoning District Class C, which specifies maximum permissible sound levels of 70 dBA in the daytime and 70 dBA at nighttime. Dairy operations will generate noise in keeping with agricultural zoning of the parcel. The primary noise receptors in the area would be farmers working nearby parcels. Noise from the
dairy will not exceed the DOH threshold, and will not contribute to excessive noise in the region.

Traffic

The EIS Section 4.18 and 4.25 includes an evaluation of roadways and traffic conditions, along with potential impacts of the Dairy Farm construction and operation. Primary access to the site is via Māhā‘ulepū Road, a two-way two-lane road, which is accessible from Köloa Road (Highway 530) via Ala Kinoiki Road. Within the project area, there is a network of unimproved private agriculture haul roads that provide access to and from Māhā‘ulepū Road.

Traffic operations along Māhā‘ulepū Road and the surrounding County roads are expected to continue to operate at acceptable levels of service during peak hours of traffic. The projected increase in vehicle movements related to HDF operations at is shown in EIS Sections 4.17 and 4.24. Daily employees entering the site, milk tanker and supply trucks, and a pick-up truck with stock trailer will increase vehicle trips by a total of 12 per day for the committed herd size, and by 23 vehicle trips per day with the contemplated herd size. These additional trips represent less than 1 percent of total vehicle movement in the area. HDF would have a minimal effect on traffic conditions at County roadways in the surrounding area.

Recreation

The State Department of Health Clean Water Branch noted in its Sanitary Survey prepared for the watershed that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The predicted risk of illness from recreation exposure to a cattle-impacted waterbody is 25- to 150-times lower than the risk of illness associated with human sources of contamination.

As stated previously in reference to surface water runoff and nearshore marine impacts, long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team regarding changes in water quality. Data from the nearshore water quality monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

Infrastructure Concerns

Construction of the dairy facilities would require temporary power demands similar to any small-scale development on Kaua‘i. A request for power would be submitted to the utility. Power for construction could be supplemented with onsite gas-powered generators for use of typical construction power tools. The pasture-based dairy system allows cows to remain in the field for 22 hours of each day and does not require the energy-intensive cooling systems utilized by a conventional confined feedlot dairy (see Chapter 6, Section 6.4). No significant electrical demand will be required by HDF.

III. Public Health Concerns

As stated previously regarding water quality, no impacts are anticipated to the aquifer deep in the unweathered volcanics, which is the source of potable water. The shallow level groundwater in the alluvial material on the valley floor is hydrologically separated from the deep aquifer.

A long-term water quality monitoring program will be instituted to regularly sample and analyze nutrient levels the surface waters (agricultural ditches and Waiopili Ditch). The monitoring program and methods will be established to meet the CWB quality assurance/quality control requirements.

As stated previously in reference to air quality, particulate matter (PM) emissions modeled from HDF operations do not exceed State standards. Equipment utilizing petroleum fuels will consist of standard farm vehicles: tractor/mower; pick-up truck; and a small utility vehicle. Milk tanker trucks are anticipated once every two days for the committed herd size, and twice daily at the contemplated herd size.

In waste treatment, the primary functions of soil are to prevent migration of pathogens to surface water or groundwater, retard and reduce contaminants, and provide a barrier against direct human contact with effluent. A study prepared for the State of Hawai‘i Department of Health (DOH), Safe Drinking Water Branch identified groundwater zones most at risk from on-site disposal systems by evaluating – among other parameters - soil filtering capacity. The study mapped soil hydraulic conductivity state-wide. For adequate treatment to occur, the soil must be permeable enough to prevent saturated conditions, but also have a small enough pore throat diameter to filter pathogens from the effluent. Clay particles act as sorption sites for nitrate and other nutrients. Bacteria in soils can convert reactive nitrogen species into inert nitrogen gas.

Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. The hydraulic conductivity of permeable flank lavas in the Hawaiian Islands ranges from hundreds to thousands of feet per day, whereas estimates for less permeable dikes intruded lavas range from 1 to 500 feet per day. The EIS Chapter 4, Figure 4.3-2 depicts the hydraulic conductivity for the south Kaua‘i area. Permeable lavas, represented by a high hydraulic conductivity, increase the distance groundwater can travel before pathogens die-off or contaminants can degrade to a point of being benign. The weathered alluvium of Māhā‘ulepū Valley shows a hydraulic conductivity on the order of 10.5 – 50 feet per day, whereas the adjacent soils of the Köloa-Po‘ipu region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area, allowing greater time for the remedial properties of soil and associated bacteria to denitrify nitrates and render potential contaminants inert.
Integrated pest management utilizes knowledge of the ancient food web among species. Disrupting reproduction of potential pests with appropriate means at key points in the life cycle has been used in Hawai‘i for decades. Extensive importation of dung beetle species between 1898 and 1985 in response to cattle-related pest species resulted in 14 dung beetle species becoming established on Kaua‘i. Cattle egrets, a bird species introduced to Hawai‘i in the late 1950s to control cattle-associated insects, break up dung patters while searching for prey. Dung beetles speed incorporation of the manure into the soil by breaking up bovine manure patrols and transporting the organic material into the soil. A healthy population of dung beetles can bury a dung pat in one to three days.

Long-term management for pests relies on a natural food web cycle that will expand as the habitat (manure) is increased. Breaking up and burying the dung patty destroys the habitat for insects such as flies to complete their life cycle. The stable fly requires approximately 21 days within the dung patty for the immature life stage (egg to pupal to survive). The house fly takes 7 to 10 days from egg to fly, and can use a number of damp, decaying material as habitat. The horn fly takes 10 to 20 days from egg to adult. Research shows that 95 percent fewer horn flies emerged from dung patties containing a beetle species that has been identified at the HDF site.

In the short-term, supplemental pest control using mechanical and chemical methods may be used to prevent any spike in pest populations. Mechanical methods include sticky tapes or ribbons that could be used in the milking parlor or covered areas of the dairy facility. Traps will be used as needed for both monitoring and removal of flies. Traps can use attractants or not; versions designed for use outdoors could be used in paddocks from which cows are excluded (those not being actively grazed). Chemical methods may be used to prevent short-term spikes in pest populations. Insecticides and herbicides are non-discriminatory and kill beneficial as well as pest insects. Such control would only be used when needed by those qualified to apply chemicals, and in accordance with authorized procedures and regulatory labeling requirements.

Supplemental grain for cows is stored in above-ground silos and fed in troughs within the milking parlor. Best management practices to be used at HDF include sweeping up of any spilled feed; such practices will minimize attractants for rats. Rodents and other pests have the potential to impact dairy operations and will not be tolerated.

A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH. 100 percent of the manure produced on site will be applied to the pasture grass and will not be stored in lagoons like a conventional feedlot dairy.
Your letter and this reply will become part of the public record and be appended to the Draft EIS. This response letter accompanies your copy of the Draft EIS. Should you prefer an electronic copy of the Draft EIS, it can be found on the OEQC website: http://tinyurl.com/OEQCKAUA1. Search “Hawai‘i Dairy Farms” to find the published Draft EIS.

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

cc: Hawai‘i Dairy Farms
    Hawai‘i State Department of Health,
    Environmental Planning Office
INDIVIDUALS
I am a resident of Poipu. As such, I live downwind from the proposed Hawai'i Dairy farm. I wish to register my strong opposition to establishment of the dairy farm at the proposed site for the following reasons:

1. I believe the proposed dairy would contaminate the air, sending harmful airborne pathogens and other air pollutants downwind. I am a medical doctor and am quite concerned about this issue. I would like the Environmental Impact process to take into account the following information and medical concerns. Animal feeding operations (AFOs) are animal farming operations, such as dairy farms, where dairy cows and other livestock are managed. AFOs generate volatile organic compounds (VOCs), that is, organic gases that react with the atmosphere to create pollution. In its August 15, 2001, report "Emissions From Animal Feeding Operations", posted on www.epa.gov, the EPA provided the following information:

"Animal feeding operations can emit ammonia, nitrous oxide, hydrogen sulfide, carbon dioxide, VOCs, hazardous air pollutants, and particulate matter. These emissions can have a variety of harmful health effects. VOCs also contribute to the formation of atmospheric ozone which is a respiratory irritant. Some VOCs are designated in the Clean Air Act as hazardous air pollutants."

Beyond my concerns about the health hazards of the dairy farm at the proposed site, I am also concerned about the anticipated "rotten eggs" odor that will appear in the air as a consequence of the released of hydrogen sulfide from the cows burps, farts, and manure.

2. I believe the proposed dairy would put at risk the survival of several endangered species. The Hawai'i Dairy Farm claims to be effluent-free, but they have not demonstrated that they have adequately taken into account the actual reality of rainfall on Kauai. Several years ago there was an episode of rain on Kauai that persisted for forty days and forty nights without stop. One consequence of this exceptionally heavy rain event is that one of Kauai's water reservoirs overflowed, sending tons of water hurtling downhill and killing seven people. Now that we know that such a thing can happen on Kauai, the EIS for Hawai'i Dairy Farm should prove beyond doubt that it can handle such an event. Of course, in addition to the 40 days' rain that so devastated the island, Kauai is subject to hurricanes. Such weather events would overwhelm any catchment basins for treating cow manure and urine that HDF is planning to construct. The results would be run-off of polluting substances into the near-by ocean and along the coastline, endangering the survival of marine wildlife protected by the Endangered Species Act.
HDF bills itself as a zero discharge operation but must prove that claim before it starts operation, including any construction activities. After conducting an intensive groundwater monitoring and modeling study, HDF may determine that is simply not feasible to put any type of manure storage lagoon in this area. It may decide either to abandon the project for a dairy farm altogether or to move it to a medically and environmentally safer location.

Sincerely,

Martin Albert, M.D.

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May 26, 2016

Martin Albert M.D.
2330 Ho`ohu Road
Koloa, HI 96756
malbert@bu.edu

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Martin Albert:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 21, 2015, described the proposed pasture-based rotational grazing system...
and cow races are designed to provide a comfortable path under hoof. The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups. Cows spend 22 hours of each 24-hour period grazing on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility. Surfaces of the walkways and races are wide to reduce stress to the animals. The grass paddocks are divided into paddocks averaging 3 to 5 acres in size. Portions of each paddock are set aside for pastures and race areas. Paddocks are used sequentially, allowing grass to grow and mature in the areas. The portion of the paddock area designated for pasture will include storage tanks and silos, effluent storage ponds, livestock water systems, and a small maintenance area. The proposed dairy operations that could pass through to ground and surface waters are identified in the environmental impact statements. The term "grass-fed" was used in the HDF EIS. This term was used to identify pasture-based production models, such as the HDF system, that are designed to utilize 100 percent of the cows' diet. In January 2016, the USDA Marketing Survey created a narrow legal definition of "grass-fed", the term in not used in this EIS. The Food and Drug Administration (FDA) a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows' diet. However, nutrients would be introduced to the HDF site with the effluent through the irrigation systems. Therefore, HDF elected to discontinue use of the term "zero discharge" as it was used in the environmental impact statements. The term "grass-fed" was used in the HDF EIS. This term was used to identify pasture-based production models, such as the HDF system, that are designed to utilize 100 percent of the cows' diet. In January 2016, the USDA Marketing Survey created a narrow legal definition of "grass-fed", the term in not used in this EIS. The Food and Drug Administration (FDA) a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows' diet. However, nutrients would be introduced to the IDF site with the effluent through the irrigation systems. Therefore, HDF elected to discontinue use of the term "zero discharge" as it was used in the environmental impact statements.
699 mature dairy cows at the Māhāʻulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

**FLORA AND FAUNA:** Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened, or proposed under the State of Hawai‘i’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the property itself. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plants species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhāʻulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kaua‘i may overfly the site. The endangered Hawaiian goose, nēnē was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kōloa area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to project-species areas, marking tall structures and fencing with white visibility polytape, limiting nighttime lighting, and shading any outside lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrogen oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.
DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours—two separate milking cycles—moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kauai, and the total concentration was compared to the state ambient air quality standards. Only the contemplated herd size of up to 2,000 milking cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM2.5 is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odor emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing dilute nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 milking cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670 feet (within one-third of the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours—two separate milking cycles—moving to and from the barn for the 10- to 15-minute milking sessions.

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This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: http://tinyurl.com/OEQC1AUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Although HDF made it clear that it is aware of at least four native bird species that are listed by both federal and state they have failed to address the requirement to conform to this Act.

My comments are based on the fact that HDF’s Waste Management Plan (“WMP”) clearly indicates that this facility is being designed from the ground-up to handle 2,000 head and therefore 2,000 head should be the number that is evaluated throughout this EIS process, not the deceptively low 699 figure used by HDF in its paper. The deceptive practices of HDF are clear in the fact that they deliberately picked the number 699 to avoid being labeled a large dairy animal operation, and therefore subject to more restrictive federal laws. The definition of large begins with 700. This pure deception must be understood, revealed and reacted to with great attention to their lack of concern for the people and the environment.

Studies have indicated that a dairy that has 700 mature dairy cows housed on site produces similar waste load as a city of 411,000 people. This means that HDF’s 2,000 dairy cows will produce, on average, the same amount of waste generated by a human population of 328,800.

HDF’s proposed dairy would create five times more waste than the entire human population of Kaua‘i. Unlike human waste, however, which is required to be treated, HDF will dump the waste created by its herd directly onto the 517 acres of land it has secured for grazing.

The pollution that originates from HDF’s proposed facility will include contamination of surface waters that eventually discharge into the ocean. The natural watercourses and man-made ditches traversing the proposed HDF site should properly be construed as “Waters of the State,” as well as “Waters of the United States,” protected by water quality standards.

The area where the discharges will occur has been designated as Class 1 critical habitat by the State.

Although there are two identified wetlands on the site, each of which receives runoff and likely groundwater originating from the pastures, HDF has not offered an analysis of how manure-contaminated water will impact the coastline, the critical habitat designations, or the Class 2 inland water that leads to the Class A marine waters along the Māhā‘ulepū coastline.

The topography of the site also presents risks to surface water. Water will flow downhill. HDF knows this. Their WMP contains a topographical map and narrative explaining how the project site slopes downhill from 150 feet elevation, to 60 feet in elevation, and finally to sea level. Manure-contaminated water will therefore flow naturally to the low points – the ditches and canals – where it will then follow the predominant surface water flow into the ocean.

Besides runoff from fields to which manure is applied, it appears obvious that precipitation will also convey nutrients from the fields and into surface waters – including the various wetlands located on and around the site.

While HDF claims that it will apply manure with an eye toward the weather, it is well-known that storms are unpredictable and deposit substantial amounts of rainwater over a very short period. HDF should be required to explain, in detail, how its lagoons were sized to deal with a 25-year, 24-hour precipitation event in addition to average monthly precipitation depths.

If the dairy were approved and constructed, such a significant rainfall event could cause the lagoons to fail and almost certainly to overflow, releasing substantial amounts of manure that will eventually flow and runoff into surface waters. The EIS should anticipate the environmental and economic impacts of a catastrophic weather event, lagoon breach, or other severe emergency constituting a “worst-case” scenario at the proposed dairy.

HDF must analyze all of these points in its EIS, and should offer a careful examination of what problems each manure constituent can create. For instance, excess phosphorus in surface waters can lead to eutrophication; bacterial contaminants such as E. coli and fecal coliform can render surface waters unsuitable for consumption, recreation, and other uses; and nitrogen (in nitrate form) can move into surface waters and, from there, percolate into the underlying aquifer, rendering the groundwater unfit for human use.

HDF’s WMP does not even identify all of the wells in the project area and provides a skewed picture of how far away those wells are; for instance, while HDF claims that one county well (Kolou F) is over a half-mile away, in reality it is only 750 feet from the paddock in which sludge from the settling basin is proposed to be deposited. HDF should be required to undertake an intensive groundwater study to determine the fate and transport of nitrate to the underlying aquifer. Additionally, multiple groundwater monitoring wells should be required to be installed to monitor whether the dairy, if approved, is impacting the groundwater. If it is, then the dairy must be required to take remedial action, including possible cessation of operation.

HDF needs to analyze how manure storage and applications will interact with the wetlands on and nearby the project site. It appears that the wetlands and, indeed, much of the project site itself, comprise a large portion of the watershed that feeds the aquifer – an aquifer relied upon for clean, safe drinking water. HDF proposes to draw 3 million gallons of water per day from Grove Farm wells. As water is drawn for use in the dairy’s daily operations, the concentration of nitrate in the aquifer will increase.

An investigation into whether the aquifer can support the proposed use of groundwater for daily operations should be conducted and included in the EIS. The withdrawal of 3 million gallons of water per day from an already-sensitive aquifer presents its own concerns. HDF must analyze whether the significant water drain its proposed dairy will have is sustainable in light of limited supply of fresh water provided by this aquifer.

HDF bills itself as a zero discharge operation but must prove that claim before it starts operation, including any construction activities. After conducting an intensive groundwater monitoring and modeling study, HDF may determine that is simply not feasible to put any type of manure storage lagoon in this area.

Sincerely,

P. H. Albert
Dear Phyllis Albert:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will continue to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPNI), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPNI. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the cows’ diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliancé, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initiated at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and race minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways...
Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and the beef market with higher quality milk. All cows will be treated with a high standard of care to ensure the health and welfare of all animals. The use of antibiotics approved by the Food & Drug Administration (FDA) may prescribe the use of antibiotics approved by the Food & Drug Administration (FDA) for the treatment of certain infections or conditions. Antimicrobial stewardship programs and veterinary consultation will be utilized to minimize the risk of antibiotic resistance. An assessment of antibiotics, including laboratory tests of milk for traces of antibiotic residue, will be conducted as a routine practice.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of the drainage ways, buffer strips will be managed or restored to reduce erosion, improve stability of ditch banks, and prevent sediment from entering the drainage ways. The riparian buffer strip will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow property. The project will include vegetated buffer strips along the drainage ways to stabilize the effluent storage ponds. No long-term impacts to native plant habitats or threatened plant species will occur as a result of the dairy.

Commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, timing of plant nutrient and soil amendment application, and the timing and application of nutrients will correspond with plant uptake, soil pH, and other site-specific conditions. For more information on nutrient balance, see Section 3.7 of the Draft EIS.

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A botanical survey of the dairy property was conducted in August 2014 by AECS Consulting to assess the existing plant species. The survey also investigated for the presence of endangered, threatened, or proposed under any state or federal endangered species programs in or near the project property. The survey covered the dairy site area and immediate vicinity. Common bird and terrestrial mammal species were documented to be present and historical uses for intensive agriculture very much limit the natural presence of wildlife on the project property. The project will include vegetated buffer strips along the drainage ways to stabilize the effluent storage ponds. No long-term impacts to native plant habitats or threatened plant species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rama Biological Consulting. The survey was conducted to assess the potential presence of avian and mammalian species on the project property. The project will include vegetated buffer strips along the drainage ways to stabilize the effluent storage ponds. No long-term impacts to native plant habitats or threatened plant species will occur as a result of the dairy.

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Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kauai may overfly the site. The unweathered volcanics by orders of magnitude. Hydraulic conductivity represents units of feet per day. It is a measure of how easily water will move within the property. It is probable that some nest on or adjacent to the site as this species nests slower than the neighboring area.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable future conditions are presented in the Draft Environmental Impact Statement. Though the waterbody in which the County well occurs is confined and the groundwater in the volcanic aquifer layer is hydrologically separated from shallow groundwater within the alluvium to allow monitoring of water quality, there is no hydraulic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**GROUND WATER**

**Hydrology:**

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-gallon (17,000-L) MGD (million gallons per day) of potable water that will be used for milk production, will be provided through an on-site well. The State of Hawaii Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milk processing. Potable water demand is 80.000 gallons (300,000-L) per day, which is 4% of the 2.000-millimeter (78.7-Ft) rainfall deficit. Additional water use includes irrigation, cleaning, and plant and equipment maintenance. All possible water used as wash water cycle. Long-term groundwater supplies impacts are not anticipated to be significant.

Groundwater Monitoring: Four groundwater monitoring wells were installed by Napali formation lavas of the Waimea volcanic series. Surfaced lavas of the Napali form on the upland area of the Waimea region. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

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**Phyllis Albert**

May 26, 2016

[91x105]Phyllis Albert

May 26, 2016

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quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōkō-po‘ipō region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōkō - Po‘ipō - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the ʻI‘iopu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makaawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CBW to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Fecal animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal wallow, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainage way (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural
fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīlauea-Poʻipiʻi region were also calculated. Nitrogen input to the marine environment in the Poʻipiʻi region is calculated to be 38,510 pounds annually, or 35 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipiʻi region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopehu Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CBR, dairy neighbors and the local Kauaʻi community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: search “Hawaii Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

An Environmental Impact Statement (EIS) is being prepared voluntarily by the Applicant to assess potential environmental impacts and mitigation measures associated with agricultural operations at Hawai‘i Dairy Farms (HDF) at Māhā‘ulepū, Kaua‘i.

To assist in preparing the EIS, an Environmental Impact Statement Preparation Notice (EISPN) was recently published, with a 30-day public comment period on the EISPN ends February 23, 2015. The purposes of the publication and comment period are two-fold:

1. to allow individuals and groups to request to become a consulted party; and
2. to provide written comment regarding the effects of the proposed action.

NOTE: Submitted comments will be published in the Draft EIS

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RETURN TO:
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Attn: HDF Project
Honolulu, HI 96813
hd@group70intl.com

AND/OR:
Hawaii State Department of Health
Environmental Planning Office
919 Ala Moana Boulevard, Rm. 312
Honolulu, HI 96814
epio@doh.hawaii.gov

DEADLINE: February 23, 2015

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COMMENT

Name: Table: Tace Albrecht Organization:

Preferred contact Method
Email: j.t.albrecht@hawaii.gov Postal Address: 1661 Rie Rd Ste #4306
Phone: (Optional) 808-786-1222 E-mail: rie.com
Koloa, HI 96756

Comments: Please ensure that the EIS addresses all potential impacts and costs of pollution of our ocean waters and beaches caused by animal waste resulting from hundreds (and possibly thousands) of cows at the proposed dairy. These include:

- Runoff from the Hanalei watershed
- Health hazards from waste containment spills during storms and hurricanes
- Danger to drinking water sources
- Traffic problems exacerbated by transport of waste, products and other materials
- Extreme offensive odor extending for miles across valuable property affecting residences and world class beaches and causing loss of quality of life
- Cost of cleanup of beaches
- Cost to the state and tax payers for monitoring and enforcement

(Continued on Page 2)

Page 2

Cost of lost tourism and ruined reputation of Kaua‘i’s world famous beaches, particularly Poipu Beach.

- Cost to residents for reduced real estate values at Poipu
- Loss of quality of life if there is contamination of water or beaches

In conclusion, we moved to Kaua‘i years ago to retire in this beautiful tropical paradise where clean, pure air blows through our homes and the ocean and beaches are clear. Sadly, now this paradise is threatened with air pollution caused by the proposed dairy and its cow manure, and the ocean and beaches also face pollution from the dairy. This project is causing anger and angst among the residents of the area, which will surely grow into additional lawsuits if this project occurs.

We request that we become a consulted party.

CC: Hawaii State Dept. of Health, Environmental Planning Office
Bernard Carvalho, Mayor, County of Kaua‘i
Arnold and Jane Albrecht  
1661 Poe Road, Suite 4306  
Koloa, HI 96756-9591

May 26, 2016

Dear Arnold and Jane Albrecht:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. Ongoing dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to ongoing dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $60,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For ongoing operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and an additional 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E...
and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silt and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 1/5 - 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD) of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaii Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalbhee districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day from the current evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resources Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running...
through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery.

Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watershed: DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dême canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations: Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal waddleways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kāloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater...
and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipu region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment**

An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrient and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CBW, dairy neighbors and the local Kaua‘i community.

**TRAFFIC**
The Draft Environmental Impact Statement (EIS) Section 4.18 and 4.25 includes an evaluation of roadways and traffic conditions, along with potential impacts of the dairy farm construction and operation. Primary access to the site is via Māhā‘ulepū Road, a two-way, two-lane road, which is accessible from Kōloa Road (Highway 530) via Ala Kinoiki Road. Within the project area, there is a network of unimproved private agriculture haul roads that provide access to and from Māhā‘ulepū Road.

Roadways in the project area operate smoothly with no periods of heavy traffic. On average, traffic in the region is much lower than urban areas in the state due to the low population of Kaua‘i and rural agricultural demographics of the south Kaua‘i area and Māhā‘ulepū. Traffic on Māhā‘ulepū Road consists of agricultural vehicles, residential and resort visitor traffic.

During construction, the proposed project is not expected to have a significant short term impact on traffic operations in the project vicinity. Additional traffic will be generated during construction, but will return to normal levels after project completion during day-to-day operations. There will be no change to traffic patterns or infrastructure related to the public roads.

Traffic operations along Māhā‘ulepū Road and the surrounding County roads are expected to continue to operate at acceptable levels of service during peak hours of traffic. The projected increase in vehicle movements related to HDF operations for the committed herd size of 699 cows would include 5 daily employees accessing the site, milk tanker and supply trucks every two days, and truck with stock trailer, for a total of 12 additional vehicle trips per day. Daily traffic along Ala Kinoiki Road and Kōloa Road was 8,000 and 6,500 cars daily; HDF-related traffic would add less than one percent additional trips. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area.

At a contemplated herd size of up to 2,000 cows, an additional 11 vehicle trips per day would access the HDF site, for a total of 23 vehicle trips daily. Projections for daily vehicle movements in 2035 for Ala Kinoiki Road and Kōloa Road are 7,200 and 9,500 daily vehicles. HDF-related traffic would add less than one percent. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area. Traffic data is presented in the Draft EIS Sections 4.18 and 4.24.

Construction equipment mobilization will comply with Hawai‘i Department of Transportation and County requirements. Delivery trucks and milk tanker trucks will be in compliance with State and County size and weight limits; no oversized vehicles will be used for ongoing operations.

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odors. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAsQ) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure...
application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

**DUST**

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours - in two separate milking cycles - moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM0 and PM1.5) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 milking cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM0 is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM2.5 is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 milking cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 milking cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OIEC website at the following URL search "Hawai'i Dairy Farms": [http://tinyurl.com/9E0CK4U4](http://tinyurl.com/9E0CK4U4)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

[Signature]

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
From: Jo Amsterdam <joamsterdam@hotmail.com>
Sent: Sunday, February 22, 2015 1:34 PM
To: HDF
Subject: Mega Dairy @ Maha'ulepu

Aloha HDF,

I am very concerned about the cultural, environmental, and financial aspects of this proposed dairy. The area is very sensitive for all these reasons. Our water for Poipu and Koloa will be polluted and unfit to drink as well the ocean will not be fit for swimming. For many of the visitors to this area a dairy would be the reason they do not return. There are many acres of land owned by Grove Farm which would be much more well suited for a dairy. WHY would this be the place you want to destroy? Please reconsider and find a place where the flies, smell, urine, and poop will not ruin peoples livelihood and compromise their health. Thank you. Sincerely Jo Amsterdam

May 26, 2016

Jo Amsterdam
joamsterdam@hotmail.com

Subject: Hawai'i Dairy Farms

Dear Jo Amsterdam:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā‘ulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly; the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could
inadvertently be brought to the dairy and utilize manure as a food source. HDF will
not significantly affect recreational and resort areas.

The groundwater and surface water analysis conducted for this Draft EIS identified
two groundwater bodies within the valley: (1) groundwater located in a deep
aquifer system within unweathered volcanic material, which is buried beneath thick
alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The
aquifer of highest value and use resides deep within the unweathered volcanic
material. The alluvial material blanketing the valley floor is less permeable than the
unweathered volcanics by orders of magnitude. Hydraulic conductivity represents
the ability of soils to transport water given a hydraulic gradient, and is expressed in
units of feet per day. It is a measure of how easily water will move within the
ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley
and the HDF site ranges from 105 – 50 feet per day. The hydraulic conductivity of
soils in the adjacent Kūloa-Poʻipū region is on the order of 201 – 500 feet per day.
Therefore, water movement through soils under the proposed dairy site is 10 times
slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether
the two waterbodies within Māhāʻulepū may be connected. Four studies were
conducted to determine whether the shallow groundwater in the alluvial material
might discharge into the lower aquifer confined in the unweathered volcanic
cmaterial at depth, which is the source of potable water. The results demonstrate
there is no hydrologic connection between the deep aquifer in the unweathered
volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft
EIS provides further detail.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on
groundwater and surface water resources in the area, and evaluated potential
impacts from the proposed Māhāʻulepū Dairy Farms (HDF) actions. Existing conditions
and probable impacts are presented in the Draft Environmental Impact Statement
(EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E
and F. The location and connectivity of groundwater bodies were determined, and
the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area’s hydrology is shaped by its geology. The Kūloa area was built
by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali
formation exhibit extensive weathering which may extend to considerable depths –
as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite,
a soft, thoroughly decomposed rock. The Māhāʻulepū Valley floor is filled with
alluvium, which generally extends about 60 feet under the surface and is underlain
by highly weathered lava at a shallow depth by secondary eruptions of the Kūloa
series. The alluvial material is highly weathered lava and is comprised of dark
brown to black silty clay and clayey silt.

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brown to black silty clay and clayey silt.

Threatened. Native Drosophila habitat is located many miles away in the high
elevation koa-'ōhia forests.

Fly populations at HDF will be minimized through a process known as Integrated
Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate
measures at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of
invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950
to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web
among species.

An especially important insect to minimize fly breeding habitat in manure is the
dung beetle, which buries manure and incorporates it into the soil. Populations of
dung beetles found on Kaua‘i and those species already in Māhāʻulepū Valley will
increase with the increased manure food source, thus increasing and speeding
breakdown of manure. Dung beetles are specialists in the very important natural
process of breaking up and quickly recycling bovine manure pads. The behavioral
diversity among dung beetle species will work together to bury dung pats in one
to three days, a shorter amount of time than the 10-30 days flies need to hatch.

In the Kūloa-Poʻipū region, pest fly populations are dependent upon food and
breeding sources nearby such as dog, cat, and chicken feces. Beef cattle grazing in the
region on agricultural lands along Ala Kinoiki Road between Kūloa and Poʻipū, and it
is likely the livestock-related flies identified at the HDF site occur in this region as
well. Localized controls to reduce pest populations need to address breeding sites in
and amongst the food and animals wastes within the area. These mitigation
measures will make it difficult for flies to breed, and BMPs will be enforced to
address any increase in population, therefore it is expected that the dairy farm will
not significantly affect recreational and resort areas.

**Potable Water:** Once fully operational at the committed herd size of 699 mature
dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million
gallons per day (MGD). Potable drinking water quality water from groundwater
provided through an on-site well. The State of Hawai‘i Department of Health Milk
Rules require that potable water be used for milk production, both in the milking
parlor and for milking operations; another potable water use will be for livestock
drinking water. Should HDF decide, in the future, to expand to the contemplated
herd size of up to 2,000 mature dairy cows, potable water demand will increase to
88,900 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD
produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane
plantation era. All potable water used as wash water will be re-applied to pasture
and thus remain a part of the evapotranspiration cycle. Long-term groundwater
supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy
operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the
County’s Kūloa F well, will result in no adverse impacts to ongoing use of
groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well. Though the waterbody in which the County wells occur is confined and hydraulically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kūloa Fowell in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kālihe‘e districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: sift fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment log around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makua‘wiwai Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The main concern, however, is the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to...
create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūʻalepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kauaʻi community.

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft BIS Appendix I.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaiʻi has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.
DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM$_{10}$ and PM$_{2.5}$) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 milking cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM$_{10}$ is 2.01 μg/m$^3$, well below the State standard of 150 μg/m$^3$. The estimated concentration for PM$_{2.5}$ is 0.23 μg/m$^3$, well below the Federal standard of 35 μg/m$^3$ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy herds and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 milking cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 milking cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

DEMOGRAPHIC AND ECONOMIC:
The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plach Econometrics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. Generally, the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be
The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**ALTERNATIVES:** As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location, and (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i. The alternative of ‘No Action’ is also evaluated. One additional alternative, considering a scenario for the Dairy Products at an Off-Island Facility, was evaluated.

Although the alternative approaches are potentially reasonable uses under existing zoning and neighboring uses, they each fail to comprehensively fulfill the requirements defined with the five established Evaluation Criteria (EV). The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand, reducing dependence on imported milk (Criterion 1). This alternative, however, would not be pasture-based and could negatively affect air and water quality.
- None of the alternatives would include a dairy location that meets the requirements of a pastoral, rotational-grazing dairy minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, livestock management, environmental resources management (Criterion 2). However, the purpose and need to provide fresh fluid milk would only be met with the Conventional Feedlot Dairy Alternative.
- The alternative for Agricultural Park could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). After many years, Grove Farm encountered limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Criterion 5) the four alternative scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast, the planned agricultural operations of Hawai‘i Dairy Farm, were determined after substantial analysis to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach...
that achieves project objectives and meets each of the five Evaluation Criteria (Section 2.3.4):

Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of fresh milk demand, reducing dependence on imported milk (Objective 1).

- The planned dairy location that meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soils science, livestock management, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100% of manure as natural fertilizer to grow the majority of food for cows (Criterion 4).
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Criterion 5).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai‘i Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Gary R. Anderson:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. Your comments were received by the State of Hawaii Department of Health Environmental Planning Office. The Department of Health forwarded a copy of your comments to Group 70 International in order to be included in the Draft Environmental Impact Statement (EIS) analysis. This letter was prepared in response to your comments.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawaii. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

GROUP 70 OBJECTIVITY: Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawaii Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawaii Revised Statutes and the “Environmental Impact Statement Rules” (Chapter 200 of Title 11, Hawaii Administrative Rules). The environmental
planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State and Federal agency. On numerous past EIS projects, the Hawaii Chapter of the American Planning Association has recognized Group 70's professional work with Chapter awards for excellence in environmental planning. Part of the EIS scoping process involves Group 70's experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai'i Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

**NATURAL HAZARDS:** The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhā'ulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai'i Dairy Farms (HDF) lies between the 60 and 150 foot elevation, outside the tsunami evacuation zone. The Kaua‘i and Ni‘ihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands.

Although they occur infrequently, Kaua‘i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhā'ulepū region during and following the hurricanes that affected Kaua‘i in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhā'ulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua‘i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i’s Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plachy Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, masons, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. Ongoing dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to ongoing dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $60,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional...
The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydraulic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State Department of Economic Development and Tourism (DBEDT) projects the demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to

**GROUND WATER**

**Hydrology:** The area's hydrology is shaped by its geology. The Kāhoa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saproilite, a soft, thoroughly decomposed rock. The Māhāʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kāhoa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.
encompass 19.2 percent of the County population. For the South Kaua'i region (the Kōlā - Po'ipū - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island's infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā'ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā'ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā'ulepū Valley, which is fed by several intermittent streams coming off the south slope of the Ha'upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā'ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

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**Long-term Operations, Setbacks and Buffers**

Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolua District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageways (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application**

The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

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times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

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To provide perspective, nutrient inputs from the adjacent Kīlauea-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipūlī Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWIR, dairy neighbors and the local Kaua‘i community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Hawai'i Dairy Farms
MAHALO, KAUAI

ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

An Environmental Impact Statement (EIS) is being prepared voluntarily by the Applicant to assess potential environmental impacts and mitigation measures associated with agricultural operations at Hawai'i Dairy Farms (HDF) at Mahāulepu, Kaua'i.

To assist in preparing the EIS, an Environmental Impact Statement Preparation Notice (EISP) was recently published. A 30-day public comment period of the EISP ends February 23, 2015. The purposes of the publication and comment period are two-fold:
1. to allow individuals and groups to request to become a consulted party; and
2. to provide written comment regarding effects of the proposed action.

NOTE: Submitted comments will be published in the Draft EIS

COMMENT

Name: Kā'ehu'ari
Organization: NONE

Preferred contact Method
Email: ___________________________ Postal Address: P.O. Box 673, Lahaina, HI 96766
Phone: (Optional)

Comments: "A'ole kūkā ki'e ho'omaka i ka 5'ia. A'ole haka'i ki e kūkā ki'e ho'omaka i ka 'ōiwi. A'ole kūkā ki'e ho'omaka i ka 'ōiwi. A'ole haka'i ki e kūkā ki'e ho'omaka i ka 'ōiwi. A'ole haka'i ki e kūkā ki'e ho'omaka i ka 'ōiwi.

5) He kanakolu kūnāmalu mili ma pauna o kūkā i ho'okahi maka'iki?
6) He aha ka pilikia i ka wai - maka'ulu maka'ulu i ka ʻemi loa o ke kahawai o ʻo wailomo a me waihoku.
ENVIRONMENTAL IMPACT STATEMENT
HAWAI'I DAIRY FARMS
MĀHĀ'ULEPŪ, KAUAI

1) Māhā'ulepū is an almost pristine environment and one of the few wild places left on Kauai. I fear that development is just "around the corner," and maybe nothing is in that piece of property is the foot in the door. Please consider a different place for a dairy farm.

2) The smell of a dairy is overwhelming. Cows fart all the time. This dairy is really close to Kōloa; the trade winds blow from NE most of the time, so we'll have to be smelling that stink. It will also affect Po'ipu, our main visitor destination. Hotels that line the shoreline will be impacted, including thousands of employees.

3) This is a culturally sensitive area for Hawaiian people. There are heiau in this area, houses and farming remnants were discovered here, including the Kōloa field system, one of the largest agricultural and archeologically important historical sites.

4) Where will the water come from? Water is held in trust for the Hawaiian people. Our stream here in Kōloa, Waikomo and Waikoluā are already dangerously low. I believe it will be contaminated by a large scale dairy farm.

5) We in Kōloa do not need a major corporation here in our small village. It is an inappropriate location for such a large-scale operation. And we residents of Kōloa had no opportunity to comment before this deal was "signed, sealed and delivered."

I felt it was very inappropriate for the Hawai'i Dairy Farms planners to begin the meeting on February 19 without a Hawaiian blessing or some sort. If you come to Kauai, it would be a good thing to read up on the culture here, to familiarize yourself with the way we like to do things round here. Be respectful, polite, ask permission.

It was very rude of the HDF planners to ignore a simple plea from a Hawaiian man standing by the door that our meetings always begin with a Hawaiian prayer.

In short, I feel the people of Kōloa have been railroaded. I don't believe there was even one person who was in that Kōloa School cafeteria that is "FOP" the dairy, aside from the consultants who are being paid to support this project.

I am concerned about the place, the smell, the water, the soil, proximity to tourism & the town of Kōloa.

— Jodi Ascuena
ENVIRONMENTAL IMPACT STATEMENT

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MĀHAʻULEPŪ, KAUAI

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2) The smell of a dairy is overwhelming. Cows fart all the time. This dairy is really close to Koloa, the trade winds blow from NE most of the time so we'll have to be smelling that stink. It will also affect Poʻipu, our main visitor destination. The hotels that line the shore line will be impacted including thousands of employees.

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I am concerned about the place, the smell, the water, the soil, proximity to tourism & the town of Koloa.

– Lele Ascuena
May 26, 2016

Jodi (Ka’ehulani) Ascuena
P.O. Box 473
Lawai, HI 96765

Subject: Hawai’i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i

TMCC: (4) 2-9-003-001 portion and 006 portion
(4) 2-9-001-001 portion

Dear Jodi (Ka’ehulani) Ascuena:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

Your comments were received by the State of Hawai‘i Department of Health Environmental Planning office. The Department of Health forwarded a copy of your comments to Group 70 International in order to be included in the Draft Environmental Impact Statement (EIS) analysis. This letter was prepared in response to your comments.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**ARCHAEOLOGICAL AND CULTURAL:** The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising, given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic-era cultural materials associated with the many Land Commission Awards in the project area were non-existent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhā‘ulepū Ahupua‘a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F.
location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area’s hydrology is shaped by its geology. The Kōloa area was built by Nāpali formation lavas of the Wainee volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Sapatlite, a soft, thoroughly decomposed rock. The Māhāʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poʻipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaii’s Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus a part of the evaportranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Poʻipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,055 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa – Poʻipū – Kālāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**

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application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

**DUST**

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system would be negligible. The estimated concentration for PM_{10} is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM_{2.5} is 0.23 μg/m³, well below the Federal standard of 35 μg/m³. Dust concentrations are lower and would be neglible. The estimated concentration for PM_{10} is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM_{2.5} is 0.23 μg/m³, well below the Federal standard of 35 μg/m³. (see Draft EIS Section 4.19 and Table 4-192).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odor emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai'i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrogen oxide (N₂O) emissions from manure.
the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location, and (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i. The alternative of “No Action” is also evaluated. One additional alternative, considering a scenario for the Dairy Products at an Off-Island Facility, was evaluated.

Although the alternative approaches are potentially reasonable uses under existing zoning and neighboring uses, they each fail to comprehensively fulfill the requirements defined with the five established Evaluation Criteria (IV). The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand, reducing dependence on imported milk (Criterion I). This alternative, however, would not be pasture-based and could negatively affect air and water quality.
- None of the alternatives would include a dairy location that meets the requirements of a pastoral, rotational-grazing dairy minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion I).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, livestock management, environmental resources management (Criterion 2). However, the purpose and need to provide fresh fluid milk would only be met with the Conventional Feedlot Dairy Alternative.
- The alternative for Agricultural Park could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). After many years, Grove Farm encountered limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Criterion 5) the four alternative scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast, the planned agricultural operations of Hawai‘i Dairy Farm, were determined after substantial analysis to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the five Evaluation Criteria (Section 2.3.4):

- The planned dairy location that meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion I).
The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soils science, livestock management, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

Address the range of potential environmental impacts by utilizing 100% of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Criterion 5).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawaii Dairy Farms": http://tinyurl.com/OEQCKAUI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Janet Ashkenazy

cavemom38@yahoo.com

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhāulepū Road
Kaua'i, Hawai'i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Janet Ashkenazy:

Your comments were received by the State of Hawai'i Department of Health Environmental Planning office. The Department of Health forwarded a copy of your comments to Group 70 International in order to be included in the Draft Environmental Impact Statement (EIS) analysis. This letter was prepared in response to your comments.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai'i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 383 Hawai'i Revised Statutes and the “Environmental Impact Statement Rules” (Chapter 200 of Title 11, Hawai'i Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State and Federal agency. On numerous past EIS projects, the Hawai'i Chapter of the American Planning Association has recognized Group 70's professional work with Chapter awards for excellence in environmental planning. Part of the EIS scoping process involves Group 70's experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai'i Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawai'i Dairy Farms": http://tinyurl.com/OEOCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Terese Barich:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māha‘ulepu on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system...
as a "zero-discharge, grass-fed dairy". The term "zero-discharge" under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to groundwater and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP. This term was used to identify HDF’s intent to utilize a locally-produced feedstock - grass - for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1. Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support historic “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāʻulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways

and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gas irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kauai to be raised off-site. The committed herd size of
Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and the herd as a whole, ensuring the health and productivity of the cows. The primary noise impacts from the proposed Hawai'i Dairy Farms (HDF) activities will be minimized through proper management, as stated in Section 17 of the Draft EIS.

Ground Water:
The groundwater and surface water resources in the area, and evaluated conditions influencing their quality, were determined. The alluvial material blanketing the valley floor is less permeable than the alluvium that covers the valley floor, and groundwater in the thick alluvium. The alluvial material has high hydraulic conductivity, allowing water movement through soils under the proposed dairy site. The hydraulic conductivity ranges from 10 to 40 feet per day in the unweathered volcanic ground. The hydraulic conductivity of the alluvial aquifer system ranges from 100 to 500 feet per day. The hydraulic conductivity of the alluvium that covers the valley floor is less permeable, thereby limiting water movement through the alluvial aquifer system. The hydraulic conductivity of the alluvial aquifer ranges from 1 to 4 feet per day, depending on the location and the thickness of the alluvial layer.

WATER QUALITY:
Groundwater and surface water resources in the area, and evaluated conditions influencing their quality, were determined. The alluvial material blanketing the valley floor is less permeable than the alluvium that covers the valley floor, and groundwater in the thick alluvium. The alluvial material has high hydraulic conductivity, allowing water movement through soils under the proposed dairy site. The hydraulic conductivity ranges from 10 to 40 feet per day in the unweathered volcanic ground. The hydraulic conductivity of the alluvial aquifer system ranges from 100 to 500 feet per day. The hydraulic conductivity of the alluvium that covers the valley floor is less permeable, thereby limiting water movement through the alluvial aquifer system. The hydraulic conductivity of the alluvial aquifer ranges from 1 to 4 feet per day, depending on the location and the thickness of the alluvial layer.

Sound is generated in keeping with agricultural zoning of the parcel. The primary noise impacts from the proposed Hawai'i Dairy Farms (HDF) activities will be minimized through proper management, as stated in Section 17 of the Draft EIS.
The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaiʻi Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County's Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F WEL in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and pumped water in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaʻau community.

**Regional Water Demand:** The adjacent, developed Kōloa-Poʻipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaʻau will increase county-wide by 17,300 residents by 2030. The South Kaʻau population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaʻau region (the Kōloa- Poʻipū- Kalāhele districts), water use in 2035 is projected to be 134,870, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaʻau Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWBB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWBB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands. Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWBB to conduct a "Sanitary Survey" of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling...
within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: *Waiopili Ditch Sanitary Survey, Kauai, Part I*. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404.** HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The nutrient input from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent per year, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Mākaʻo-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate for potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment** An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline. The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring
program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

**TRAFFIC:** The Draft Environmental Impact Statement (EIS) Section 4.18 and 4.25 includes an evaluation of roadways and traffic conditions, along with potential impacts of the dairy farm construction and operation. Primary access to the site is via Māhū‘ulepū Road, a two-way, two-lane road, which is accessible from Kōoao Road (Highway 530) via Ala Kinoiki Road. Within the project area, there is a network of unimproved private agriculture haul roads that provide access to and from Māhū‘ulepū Road.

Roadways in the project area operate smoothly with no periods of heavy traffic. On average, traffic in the region is much lower than urban areas in the state due to the low population of Kaua‘i and rural agricultural demographics of the south Kaua‘i area and Māhū‘ulepū. Traffic on Māhū‘ulepū Road consists of agricultural vehicles, residential and resort/visitor traffic.

During construction, the proposed project is not expected to have a significant short-term impact on traffic operations in the project vicinity. Additional traffic will be generated during construction, but will return to normal levels after project completion during day-to-day operations. There will be no change to traffic patterns or infrastructure related to the public roads.

Traffic operations along Māhū‘ulepū Road and the surrounding County roads are expected to continue to operate at acceptable levels of service during peak hours of traffic. The projected increase in vehicle movements related to HDF operations for the committed herd size of 699 cows would include 5 daily employees accessing the site, milk tanker and supply trucks every two days, and truck with stock trailer; for a total of 12 additional vehicle trips per day. Daily traffic along Ala Kinoiki Road and Kōoao Road was 8,000 and 6,500 cars daily. HDF-related traffic would add less than one percent additional trips. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area.

At a contemplated herd size of up to 2,000 cows, an additional 11 vehicle trips per day would access the HDF site, for a total of 23 vehicle trips daily. Projections for daily vehicle movements in 2035 for Ala Kinoiki Road and Kōoao Road are 7,200 and 9,500 daily vehicles. HDF-related traffic would add less than one percent. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area. Traffic data is presented in the Draft EIS Sections 4.18 and 4.24.

Construction equipment mobilization will comply with Hawai‘i Department of Transportation and County requirements. Delivery trucks and milk tanker trucks will be in compliance with State and County size and weight limits; no oversized vehicles will be used for ongoing operations.
It seems that instead of learning from the failures of others this effort egotistically is trying to show that even though many have failed at the effort they seek, they will be the ones who succeed.

Sadly if this effort goes forward it will fail and it will take other good businesses with it. I resent the implication that it will be a valid business in the face of failures in the past.

So if you really believe it then post and escrow 5 billion dollars to compensate those who are going to have their life changed, residents in the area and downwind, those who have a business nearby and the hotel that will lose the visitors, the employees that will lose jobs, the loss of tax income for all of the county, thus burdening the people who use other service impacted by the loss of revenue and the increase in taxes possible for the county — things like stench, water pollution, and loss of business — and develop a list of the amounts that can be claimed when the problem is experienced.

And another 5 billion dollars to return the area to its current state.

No — then you do not believe that this project is correct for the masses just profitable of a few already comfortable people and a few people who really cannot get a real job, the marketers and the investment people.

Bill Barnard

Kalaheo

May 26, 2016

Bill Barnard

b2seer@gmail.com

Subject: Hawai‘i Dairy Farms

Environmental Impact Statement Preparation Notice

Mahā‘ulepū Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Bill Barnard:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. This direct-plus-indirect employment association with...
construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawaii Island), approximately 10 percent of Hawaii’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no mitigating nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhūle‘pū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhūle‘pū Valley and the HDF site ranges from 0.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhūle‘pū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaii Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlour and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhūle‘pū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.
The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōloa F Well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F Well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua'i community.

Regional Water Demand: The adjacent, developed Kōloa-Poʻipu region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua'i will increase county-wide by 17,300 residents by 2030. The South Kaua'i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua'i region (the Kōloa - Poʻipu - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua'i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococci to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococci in Waiopili Ditch and concerns about the proposed dairy prompted CBW to conduct a ‘Sanitary Survey’ of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top...
of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient input from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment:** An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurring rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kauaʻi community.

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

**Clean Air Act**
Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaiʻi has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure
application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours— in two separate milking cycles—moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM_{10} and PM_{2.5}) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM_{10} is 2.01 μg/m^3, well below the State standard of 150 μg/m^3. The estimated concentration for PM_{2.5} is 0.23 μg/m^3, well below the Federal standard of 35 μg/m^3 (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst-case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEOCKAUJA

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AIA, LEED AP
Principal Planner
One question asks why work is starting on the dairy now, prior to approval of the operation. Your answer is that HDF wants the dairy’s grass to be ready when approval comes through. This sounds as if any hearings or public meetings are simply window dressing and that the Dairy is a done deal.

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May 26, 2016

Chris Baron
bbaron@cox.net

Subject: Hawai‘i Dairy Farms

Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i

TMK: ④ 2-9-003: 001 portion and 006 portion
④ 2-9-001:001 portion

Dear Chris Baron:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

The following responses are offered to your comments:

Hawai‘i Dairy Farms (HDF) is a privately funded project on privately owned land and does not meet any of the nine “triggers” as stated in Hawai‘i Revised Statutes Chapter 343, also known as the Hawai‘i Environmental Policy Act. HDF is submitting an Environmental Impact Statement in order to show project information to address concerns expressed by the local community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://hawaii.gov/HOUCKAUAJ

Thank you for your participation in the environmental review process.

Sincerely,

Jeffrey H. Overton, AIA, LEED AP
Principal Planner
Laura Melnyk
Dept. of Health
Kokua Building
Honolulu, HI 96813

Dear Ma. Melnyk:

As long-time residents of the Kakaako area, we love and appreciate the beauty of this special place. There are many concerns we have about what changes the proposed industrial dairy (Hawaii Dairy Farms) will have on this fragile environment as follows:

We are opposed to dairy operations, although an industrial dairy makes a practical sense on Kauai. We are opposed to the location being on the South Side. We are opposed to the mill is processed for processing. We are opposed to the location being on the South Side, and the few jobs it will provide.

We look forward to your response to our concerns.

Sincerely,

Tom and Mary Bartlett
808-835-0460

February 21, 2015

cc: Jeff Ovaena
Hawaii Dairy Farms, LLC
Honolulu, HI 96813

1. Drinking water: As the primary source of water is from wells in direct proximity to the dairy location, what will happen to the drinking water? What health impacts will there be to residents and visitors downstream of the dairy?

2. Air pollution: Will the odor and methane gas generated from the dairy air be treated and guaranteed to be treated and passed through the complex before being released?

3. Visitor impact: As the Visitor area is on the same side of the Kakaako area, what impact will this have on the community, with thousands of visitors daily?

4. Property impact: What impact will this have on property values?

5. Alternative sites: There are many alternative sites that are more suitable for an industrial dairy operation that are further away from homes, businesses, parks, the ocean, water wells, etc.
ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

An Environmental Impact Statement (EIS) is being prepared voluntarily by the Applicant to assess potential environmental impacts and mitigation measures associated with agricultural operations at Hawai‘i Dairy Farms (HDF) at Māhā‘ulepu, Kaua‘i.

To assist in preparing the EIS, an Environmental Impact Statement Preparation Notice (EISPN) was recently published. A 30-day public comment period on the EISPN ends February 23, 2015. The purposes of the publication and comment period are two-fold:

1. to allow individuals and groups to request to become a consulted party; and
2. to provide written comment regarding effects of the proposed action.

NOTE: Submitted comments will be published in the Draft EIS

Name: Tom Bringhurst
Organization: Hawai‘i Dairy Farms
Preferred contact Method: Email: Tom@HDFgroup.com
Postal Address: 6530 Yoke Rd.
Phone: (Optional): 808-252-0506

Comments:
IS THIS ABOUT THE GREEVE FARM WATER RIGHTS?

why does Greg Omidjan want to hurt our community?
we demand answers!

Return to:
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Attn: HDF Project
Honolulu, HI 96813
hdf@group70int.com

Deadline: February 23, 2015

And/or:
Hawaii State Department of Health
Environmental Planning Office
919 Ala Moana Boulevard, Rm. 312
Honolulu, HI 96814
epo@hdoj.hawaii.gov

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Name: Tom Bringhurst
Organization: Hawai‘i Dairy Farms
Preferred contact Method: Email: Tom@HDFgroup.com
Postal Address: 6530 Yoke Rd.
Phone: (Optional): 808-252-0506

Comments:

water - drinking water quality due to well location

we demand answers and a solution

Return to:
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Attn: HDF Project
Honolulu, HI 96813
hdf@group70int.com

Deadline: February 23, 2015

And/or:
Hawaii State Department of Health
Environmental Planning Office
919 Ala Moana Boulevard, Rm. 312
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2. to provide written comment regarding effects of the proposed action.

NOTE: Submitted comments will be published in the Draft EIS.

Comment:

Name: Tom Bartlett
Organization:

Preferred contact Method
Email: Tom@MahalepuProp.com
Postal Address:
Phone: (Optional) 652-0406

Comments: Air Quality

Critical to the residents and visitors. Taxpayer, can you guarantee future quality? We demand answers!

BARTLET

Return to:
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Attn: HDF Project
Honolulu, HI 96813
hd@group70int.com

Deadline: February 23, 2015

And/or
Hawaii State Department of Health
Environmental Planning Office
919 Ala Moana Boulevard, Rm. 312
Honolulu, HI 96814
epo@doh.hawaii.gov

Hawai‘i Dairy Farms
MAHA‘ULEPU, KAUAI

Environmental Impact Statement Preparation Notice

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Comment:

Name: Tom Bartlett
Organization:

Preferred contact Method
Email: Tom@MahalepuProp.com
Postal Address:
Phone: (Optional) 652-0406

Comments: Alt. Location

Find another area why so inflexible?

Not opposed to dairy

Return to:
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Attn: HDF Project
Honolulu, HI 96813
hd@group70int.com

Deadline: February 23, 2015

And/or
Hawaii State Department of Health
Environmental Planning Office
919 Ala Moana Boulevard, Rm. 312
Honolulu, HI 96814
epo@doh.hawaii.gov
May 26, 2016

Tom and Mary Bartlett
P.O. Box 826
Koloa, HI 96756
tom@makaiproperties.com

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māha‘ulepū Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001: 001 portion

Dear Tom and Mary Bartlett:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, masons, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction
employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 12 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $48,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kīlauea area was built by Pāpālau formation lavas of the Waimānalo volcanic series. Surface lavas of the Pāpālau formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kīlauea series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvial deposits; and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move through the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kīlauea–Poʻipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane
through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waipio Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed on a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waipio Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococci to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waipio Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococci in Waipio Ditch and concerns about the proposed dairy prompted CWB to conduct a Sanitary Survey of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waipio Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waipio Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waipio ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waipio Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations: Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or
maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35 feet from the top of drainageway (totaling 70 feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:**

The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Ma‘u‘ulepu will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment:**

An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:**

Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

**TRAFFIC:**

The Draft Environmental Impact Statement (EIS) Section 4.18 and 4.25 includes an evaluation of roadways and traffic conditions, along with potential impacts of the dairy farm construction and operation. Primary access to the site is via Ma‘u‘ulepu Road, a two-way, two-lane road, which is accessible from Kōloa Road (Highway 530) via Ala Kimiki Road. Within the project area, there is a network of unimproved private agriculture haul roads that provide access to and from Ma‘u‘ulepu Road.

Roadways in the project area operate smoothly with no periods of heavy traffic. On average, traffic in the region is much lower than urban areas in the state due to the low population of Kaua‘i and rural agricultural demographics of the south Kaua‘i area and Ma‘u‘ulepu. Traffic on Ma‘u‘ulepu Road consists of agricultural vehicles, residential and resort visitor traffic.

During construction, the proposed project is not expected to have a significant short term impact on traffic operations in the project vicinity. Additional traffic will be
generated during construction, but will return to normal levels after project completion during day-to-day operations. There will be no change to traffic patterns or infrastructure related to the public roads.

Traffic operations along Māhāulepū Road and the surrounding County roads are expected to continue to operate at acceptable levels of service during peak hours of traffic. The projected increase in vehicle movements related to HDF operations for the committed herd size of 699 cows would include 5 daily employees accessing the site, milk tanker and supply trucks every two days, and truck with stock trailer, for a total of 12 additional vehicle trips per day. Daily traffic along Ala Kinoiki Road and Kōloa Road was 8,000 and 6,500 cars daily; HDF-related traffic would add less than one percent additional trips. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area.

At a contemplated herd size of up to 2,000 cows, an additional 11 vehicle trips per day would access the HDF site, for a total of 23 vehicle trips daily. Projections for daily vehicle movements in 2035 for Ala Kinoiki Road and Kōloa Road are 7,200 and 9,500 daily vehicles. HDF-related traffic would add less than one percent. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area. Traffic data is presented in the Draft EIS Sections 4.18 and 4.24.

Construction equipment mobilization will comply with Hawai‘i Department of Transportation and County requirements. Delivery trucks and milk tanker trucks will be in compliance with State and County size and weight limits; no oversized vehicles will be used for ongoing operations.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. ER sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act
Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST
Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂·₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂·₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR
Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor unity” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than...
detectable levels beyond the HDF site; in periods of no wind, odor may not be
dispersed creating the “worst case” scenario. In these periods without normal
tradewind flow, the odor plume would extend to the south of the HDF site. Sections
4.19.2 and 4.25.2 of the DEIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may
be detectable by 50 percent of the sensitive population once per 200 hours, or 44
hours per year, within an area that extends approximately 1,670-feet (within one-
third of a mile) beyond the dairy farm boundary, and does not reach recreational or
residential areas. Results for the contemplated expanded herd size of up to 2,000
mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF
boundary (just over half a mile), again not reaching recreational or residential areas,
and again with detection limited to 50 percent of the sensitive population
approximately 44 hours per year. The parameters used in the analysis were
intentionally conservative, and the impacts shown assume an unlikely confluence of
worst-case meteorological data, irrigation location, and grazing location. Actual
offsite odor impacts are likely to be much lower and/or less frequent than shown; it
is likely odor detection beyond the HDF boundaries will be less frequent.

ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could
attain the objectives of the action’s purpose and need, and were compared with
environmental benefits, costs, and risks of each reasonable alternative against those
of the proposed dairy project. Further discussion of alternatives can be found in
DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s
purpose and need, and compares environmental benefits, costs, and risks of each
reasonable alternative against those of the proposed action. Additionally,
reasonable land use alternatives that emerged from public input during the project
scoping phase are documented and briefly discussed. The alternatives that do not
meet the project purpose are not advanced for analysis of environmental benefits,
costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative
Rules (Chapter 11-200 (HRS 11-200)) requires a discussion of alternatives that could
attain the objectives of the action, regardless of cost. There is no requirement for the
alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed.
Rezoning the land for resort or residential development, or a potential conservation
condemnation are two uses that were examined and eliminated from analysis.
These options would not be reasonably viable given the existing private land tenure
and existing zoning. Two additional alternatives were considered as reasonable land
uses as they could be permitted within the existing State Land Use Agricultural
District and County Agricultural Zoning District. These options include Agricultural
Park with Processing Center, and development of an Agricultural Subdivision. The
alternatives were examined and eliminated from further analysis, however, as they
would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose.
Rigorous exploration and evaluation of the environmental impacts of the
alternatives, including those that might enhance environmental quality or avoid,
reduce or minimize some or all of the adverse environmental effects, costs and risks.
These alternatives include: (1) the development of a Conventional Feedlot Dairy (a
non-pasture-based dairy) at the same location; (2) development of the Pasture-
Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing
by HDF. The alternative of "No Action" is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of
potential alternatives, including the two alternative development scenarios.
Although the alternatives are potentially reasonable uses under existing zoning and
neighboring uses, each fails to comprehensively fulfill the project requirements
defined by the eight Project Objectives and the four established Evaluation Criteria
(Chapter 2, Sections 2.3.3 and 2.3.4). The essential differences as compared to the proposed action are highlighted in the
following statements:

- Only one of the alternative actions (conventional feedlot alternative) would
create a commercial scale dairy operation in Hawai‘i, with the capability to
produce 10 percent of the State’s fresh milk demand thus reducing
dependence on imported milk (Objective 1). This alternative, however,
would not reduce reliance on costly imported fertilizer and feed (Objective
2); grow local, quality grass as a primary feedstock (Objective 3); and would
not utilize 100 percent of manure on site as nutrients to grow forage for
dairy cows (Criterion 4).

- None of the alternatives would secure a dairy location that meets the
requirements for a pastoral, pasture-based grazing dairy: sufficient
contiguous land area; available long-term land tenure; adequate potable
water supply; suitable soil properties; gentle slope conditions; and
accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term
employment in the agricultural sector on Kaua‘i in a wide range of positions
including pasture agronomy/soils science, environmental resources
management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food
production utilizing Important Agricultural Lands, demonstrating the
importance of long-term agricultural leases and capital investment for
agricultural infrastructure, water systems and support facilities. (Criterion
3). However, after years of trying, it appears there was limited interest in
such a venture.

- Finally, addressing the range of potential environmental impacts (natural,
cultural, social and economic) (Objective 8) the two alternative development
scenarios would generate fewer beneficial impacts and produce impacts that
could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of
Hawai‘i Dairy Farms, was determined to be the most viable option and is the
preferred alternative. All of the alternatives considered, this is the only approach
Hawaii Dairy Farms will create a commercial scale pasture-based dairy operation in Hawaii, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

The planned action will generate new long-term employment in the agricultural sector on Kauai, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 6).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaii Dairy Farms”: [http://tceq.org/Projects/UROCKAHUA]

Thank you for your participation in the environmental review process.

Sincerely,

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Jude Basile
6404 Buckley Dr.
Cambria, CA 93428
jude@basilelaw.com

Subject: Hawai'i Dairy Farms

Environmental Impact Statement Preparation Notice
Māhāulepū Road
Kaua'i, Hawai'i

TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Jude Basile:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

LAND USE: The historical and existing land uses of the project site and surrounding Māhāulepū Valley were examined in the Draft Environmental Impact Statement (EIS), and uses proposed by the Hawai'i Dairy Farms (HDF) project were evaluated in the context of county and state land use designations for the area. The evaluation of land use is presented in Draft EIS Chapter 4.4, and the project's consistency with government plans and policies is presented in Draft EIS Chapter 5.0.

The south shore of Kaua'i is home to some of the most productive farm land in the state, attributed to consistent sunshine, ample fresh water, and a large amount of Class A and B soils (with "A" representing the class of highest productivity soils and "E" representing the lowest). The large tracts of farmland, including those of Mahaulepu Farm and Grove Farm, allow for stability in support of farm ventures, help maintain regional water systems and provide agricultural employment for Kaua'i residents in addition to fresh, local food.

The project site is on agricultural land in Māhāulepū Valley, an area with a long history of agricultural use as it was the first place in the island chain where sugarcane was commercially grown. The site is in the Agricultural District per State Land Use District designation, and per the County of Kaua'i zoning ordinance. The site consists of land classified as Prime per the State Department of Agriculture's Agricultural Lands of Importance to the State of Hawai'i (ALISH). The HDF site is outside of the County-designated Special Management Area under the Coastal Zone Management Program.

In 2005, the State established Important Agricultural Lands (IAL) by statute. The purpose of IAL is to conserve and protect agricultural lands, promote diversified agriculture, increase agricultural self-sufficiency and assure the availability of agriculturally suitable lands. The designation process determines land meet physical requirements including contiguous, functional land units large enough to allow flexibility in agricultural production near appropriate infrastructure and water, with high quality soil agricultural productivity ratings under the Land Study Bureau of University of Hawai'i.

In 2011, Mahaulepu Farm LLC filed a petition with the State of Hawai'i Land Use Commission to designate 1,533 acres of agricultural lands in Māhāulepū (including 557 acres that make up the HDF site) as IAL IAL designation meets the objectives of the State HRS §205-42 by contributing to the maintenance of a strategic agricultural resource base to support a diversity of agricultural activities and opportunities that expand agricultural income and job opportunities. See Figure 4-4-2 in DEIS Section 4.4.

The designation process determined that the land meets a number of physical requirements established in HRS §205-45, including contiguous, functional land units large enough to allow flexibility in agricultural production near appropriate infrastructure and water, with 88.5 percent of the area featuring an overall soil agricultural productivity rating of "F" per criteria established by the Land Study Bureau of University of Hawai'i.

The development and long-term operation of HDF will be in full compliance with its agricultural State Land Use District designation, ALISH classifications, and County zoning. The dairy farm will embody the intent of the IAL designation per the Hawai'i State Constitution, by using these protected lands for the intended purpose of diversified agriculture, food production and agricultural self-sufficiency. HDF development of a dairy also supports the "secondary intent" for lands in the Agriculture land designation, to provide an opportunity for Kaua'i citizens to reside in an agricultural community. This is in contrast to the described "agricultural subdivisions" that have changed parts of Kaua'i intended for a rural landscape, with development as quasi-suburban landscapes dotted with residences on large lots.

Overall, the project provides long-term benefit and support of agricultural lands and industry through continued use in keeping with zoning and IAL designation.
term operation of the dairy does not preclude the region for future protection in a coastal park at Māhāʻulepū.

**VISUAL RESOURCES:** The Draft Environmental Impact Statement (EIS) addresses the existing visual and aesthetic resources of the dairy site, and the potential impacts of Hawai‘i Dairy Farms. Draft EIS Section 4.5 addresses potential effects to public scenic views.

The County of Kaua‘i General Plan identifies the HDF site as agricultural land in a region consisting of open space, parks, and conservation lands in the mountains and along the coast. The important visual landforms identified in the surrounding region are Pu‘u Hamunui Crater to the southwest, the scenic roadway corridor of Ala Kinoiki Road, and the Hā‘upu Mountains that surround the project area to the northeast. However, the majority of the project area has gentle topography, with no evident physical features standing out within this broad agricultural valley.

The dairy site is not visible from public vantage points along public roadways and areas along the coastline. Vegetation and topography screen public views of the Māhāʻulepū Valley lowlands. Dairy farm structures will conform to County height limits for agricultural zoned land. The tallest structures of the Hawai‘i Dairy Farms facilities will include the milking parlors and the associated storage tanks, all of which are roughly 33 feet in height. These items are in keeping with the agricultural character of the area, and would be expected to have minimal to no impact on public views of the Pu‘u Hamunui crater, views from the Ala Kinoiki Road corridor, or the views of the Hā‘upu Mountains surrounding the project.

**ARCHAEOLOGICAL AND CULTURAL:** The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPP) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising, given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic-era cultural materials associated with the many Land Commission Awards in the project area were non-existent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhāʻulepū Aupu‘a‘a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully endorsed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

**FLORA AND Fauna:** Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the project area. EIS Sections 4.9 and 4.10 address the evaluation of flora and luma resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened, or proposed for listing under Federal or the State of Hawai‘i’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plants species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting. Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for...
listing under either Federal or the State endangered species lists. The survey
covered the dairy site area and immediate vicinity. Common birds and terrestrial
mammals were encountered on the property. There is no critical habitat for
endangered species in the upper Māhūlepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby
taro farm located within the HDF site. Though the area does not provide critical
habitat, seabirds that nest in upland areas of Kauai may overfly the site. The
endangered Hawaiian goose, nēnē was also seen on the site. State Division of
Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject
property. It is probable that some nest on or adjacent to the site as this species nests
in the general Kōloa area, and the habitat present on parts of the site is suitable for
nēnē nesting.

The principal potential impacts posed to the five endangered species include those
potentially associated with construction activities, and those associated with dairy
farm operations following build-out. Measures will be adopted to avoid potential
seabird and nēnē goose collisions with fences and structures. Potential measures
include lowering construction cranes at night, using conservation fencing to project-
specified areas, marking tall structures and fencing with white visibility polystyrene,
limiting nighttime lighting, and shading any outside lights used at night. Ongoing
mitigation strategies will be implemented for day-to-day preventative measures,
including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis.
While caution will be taken during any potential disturbance or vegetation removal,
there are almost no suitable roost trees within the dairy site, thus it is expected that
the dairy farm will not affect this listed mammalian species.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on
groundwater and surface water resources in the area, and evaluated potential
impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions
and probable impacts are presented in the Draft Environmental Impact Statement
(EIS) sections 4.14, 4.17, 4.22, and 4.23; the technical reports are in Appendices E and
F. The location and connectivity of groundwater bodies were determined, and
the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area’s hydrology is shaped by its geology. The Kōloa area was built
by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali
formation exhibit extensive weathering which may extend to considerable depths –
as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite,
a soft, thoroughly decomposed rock. The Māhūlepū Valley floor is filled with
alluvium, which generally extends about 60 feet under the surface and is underlain
by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa
series. The alluvial material is highly weathered lava and is comprised of dark
brown to black algal debris and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified
two groundwater bodies within the valley: (1) groundwater located in a deep
aquifer system within unweathered volcanic material, which is buried beneath thick
alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The
aquifer of highest value and use resides deep within the unweathered volcanic
material. The alluvial material blanketing the valley floor is less permeable than the
unweathered volcanics by orders of magnitude. Hydraulic conductivity represents
the ability of soils to transport water given a hydraulic gradient, and is expressed in
units of feet per day. It is a measure of how easily water will move within the
ground. The hydraulic conductivity of the alluvium that underlies Māhūlepū Valley
and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of
soils in the adjacent Kōloa-Poʻipu region is on the order of 201 – 500 feet per day.
Therefore, water movement through soils under the proposed dairy site is 10 times
slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the
two waterbodies within Māhūlepū may be connected. Four studies were
determined to conduct for whether the shallow groundwater in the alluvial material
might discharge into the lower aquifer confined in the unweathered volcanic
material at depth, which is the source of potable water. The results demonstrate
there is no hydrologic connection between the deep aquifer in the unweathered
volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft
EIS provides further detail.

**Potable Water:** Once fully operational, at the committed herd size of 699 mature
dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million
gallons per day (MGD), of potable (drinking water quality) water from groundwater
provided through an on-site well. The State of Hawai‘i Department of Health Milk
Rules require that potable water be used for milk production, both in the milking
parlor and for milking operations; another potable water use will be for livestock
drinking water. Should HDF decide, in the future, to expand to the contemplated
herd size of up to 2,000 mature dairy cows, potable water demand will increase to
84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD
produced by the on-site, existing Māhūlepū 14 well during the sugarcane
plantation era. All potable water used as wash water will be re-applied to pasture
and thus remain a part of the evapotranspiration cycle. Long-term groundwater
supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy
operation, and the 4,500-foot distance between the Māhūlepū 14 well and the
County’s Kōloa F well, will result in no adverse impacts to ongoing use of
groundwater in the volcanic aquifer layer, which is the source of potable water.
Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and
hydrologically separated from shallow groundwater in the Māhūlepū Valley, HDF
established a 1000-foot setback surrounding the Kōloa F well in agreement with the
County Department of Water. Within this setback, no effluent will be applied and no
animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF to the shallow groundwater within the alluvial to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kauai community.

**Regional Water Demand:** The adjacent, developed Koloa-Poipi region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kauai will increase county-wide by 18,500 residents by 2030. The South Kauai population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kauai region (the Koloa - Poipi - Kaliiheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Malahulepu Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Mahalepu watershed.

The HDF site is located on the bottom land of the upper Mahahualepu Valley, which is fed by several intermittent streams coming off of the south slope of the Ha'upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Mahahualepu Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or for surface waters in the Mahahualepu Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Mahaluapepü and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Mahahualepu Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and it is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Hanalei District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected...
from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūleupu will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kūloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimated potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.3 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Wainiha Ditch provides the majority of freshwater input to the main coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kauaʻi community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust
emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions. Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m3, well below the State standard of 150 μg/m3. The estimated concentration for PM2.5 is 0.23 μg/m3, well below the Federal standard of 35 μg/m3 (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual odors impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKUAJI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
From: Sabra Basler [mailto:sabra.basler@gmail.com]

Sent: Sunday, February 22, 2015 7:59 PM

To: EPO; Julie Hagensen; Cornelia Boyle; bridgethammerquist@hawaiiantel.net

Subject: Kauai dairy proposal

May 26, 2016

Aloha Reader

Well this proposal for the dairy in Kauai runs the gambit ... from a ploy to turn the land area designated important ag lands into a resort area and undesignate it as ag area, to a total disregard of the sea (and land and land users in Poipu) to maybe a real attempt at improving sustainability.

My concerns are if it were truly sustainable why not lead the world and make it organic dairy. It is beyond my understanding how those with resources to do so would not... but each man has his own consciousness so be it. Pierre, you have a right to create a non organic dairy. But you do not have the right to pollute the land, the sea and affect the growth and reproductive health of endangers sea turtles, whales and monk seals in the area, and affect the reproductive health of the fishes used for subsistence of many islanders in the Pacific.

Even if organic many concerns would arise, but since not organic my concerns magnify with cow excretion (or nutrients as they call it) not only containing nitrogen related compounds that create dead zones in turn off areas of the sea BUT ... Growth hormones, the Milk Production encouraging pharmacologicals, antibiotics, and other pesticides, herbicides, and endocrine disrupting substances could reek havoc on this island community ecosystems... growth hormones for young whales, seals turtles and reef fish ... perhaps larger fishes such as marlin and sail fish ... how will the dairy change their DNA this needs to be studied, documented and ... traffic and roads ...more study needed. If a resort ... its already the Kalahoe crawl ... then let sit down and really talk about it and not play games.

Please please look at the substances ingested by these cows and then discarded into the sea via their excrement and run off or drifting. Not all these substances will be absorbed by the land and used as a fertilizer to feed the bovine population. Much of it will wind up in the sea... do base line studies of BGH, hormone altering-related substances, nitrates, etc after the dumping of waste issues are cleared up in the area and do this right.

Please What a wonderful opportunity to do something right. Dear Pierre ... Please consider going organic and creating processing plant here so the milk is good for the island of Kauai and its people. EIS researchers consider BGH and other hormones and endocrine altering substances that will be used and their affects on the sea and all who live, dive, die, fish and enjoy that sea and the endangered species for which we are guardians.

Mahalo

Sabra Basler

Kalaheo, Kauai

Waiohai swimmer

Paddler diver

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Sabra Basler
help maintain regional water systems and provide agricultural employment for Kaua‘i residents in addition to fresh, local food.

The project site is on agricultural land in Māhā‘ulepū Valley, an area with a long history of agricultural use as it was the first place in the island chain where sugarcane was commercially grown. The site is in the Agricultural District per State Land Use District designations, and per the County of Kaua‘i zoning ordinance. The site consists of land classified as Prime per the State Department of Agriculture’s Agricultural Lands of Importance to the State of Hawai‘i (ALISH). The HDF site is outside of the County-designated Special Management Area under the Coastal Zone Management Program.

In 2005, the State established Important Agricultural Lands (IAL) by statute. The purpose of IAL is to conserve and protect agricultural lands, promote diversified agriculture, increase agricultural self-sufficiency and assure the availability of agriculturally suitable lands. The designation process determines land meet physical requirements including contiguous, functional land units large enough to allow flexibility in agricultural production near appropriate infrastructure and water, with high quality soil agricultural productivity ratings under the Land Study Bureau of University of Hawai‘i.

In 2011, Mahāulepū Farm LLC filed a petition with the State of Hawai‘i Land Use Commission to designate 1,533 acres of agricultural lands in Māhā‘ulepū (including 557 acres that make up the HDF site) as IAL. IAL designation meets the objectives of the State HRS §205-42 by contributing to the maintenance of a strategic agricultural land resource base to support a diversity of agricultural activities and opportunities that expand agricultural income and job opportunities. See Figure 4.4-2 in DEIS Section 4.4.

The designation process determined that the land meets a number of physical requirements established in HRS §205-45, including contiguous, functional land units large enough to allow flexibility in agricultural production near appropriate infrastructure and water, with 88.5 percent of the area featuring an overall soil agricultural productivity rating of “B” per criteria established by the Land Study Bureau of University of Hawai‘i.

The development and long-term operation of HDF will be in full compliance with its agricultural State Land Use District designation, ALISH classifications, and County zoning. The dairy farm will embody the intent of the IAL designation per the Hawai‘i State Constitution, by using these protected lands for the intended purpose of diversified agriculture, food production and agricultural self-sufficiency. HDF development of a dairy also supports the “secondary intent” for lands in the Agriculture land designation, to provide an opportunity for Kaua‘i citizens to reside in an agricultural community. This is in contrast to the described “agricultural subdivisions” that have changed parts of Kaua‘i intended for a rural landscape, with development as quasi-suburban landscapes dotted with residences on large lots.

Overall, the project provides long-term benefit and support of agricultural lands and industry through continued use in keeping with zoning and IAL designation. Long-term operation of the dairy does not preclude the region for future protection in a coastal park at Māhā‘ulepū.

**FLORA AND FAUNA:**

Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened or proposed for listing under Federal or the State of Hawai‘i’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or threatened plants species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened or proposed for listing under Federal or the State of Hawai‘i’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or threatened plants species will occur as a result of the dairy.

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including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai’i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built upon Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered lavas by orders of magnitude. Hydraulic conductivity represents the ability of soil to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydraulic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable drinking water quality water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Poipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Poipū - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well.
from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The deme category along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations: Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageway; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture crops with the committed herd size of 699 mature dairy cows. A supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.
The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipo‘o Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.
Dear Dr. Pressler, Ms. McIntyre of the State of Hawaii, Department of Health (DOH) and Group 70 International, Inc. And To Whom It May Concern:

Aloha! I appreciate the opportunity to comment on the proposed commercial dairy at Maha‘ulepu, by Hawaii Dairy Farms LLC.

Please deny Hawaii Dairy Farms LLC Environmental Impact Statement; on grounds of countless and myriad environmental impacts of destruction at Maha‘ulepu – should this debacle be allowed. Catastrophic, irreversible damage to the ‘aina, reef, sea life, ocean water quality and et cetera; warrant rejection of this proposal.

I want to become a consulted party to receive the Draft Environmental Impact Statement (DEIS).

At the very least, if Hawaii Dairy Farms LLC; desires to proceed on this proposed facilitate of a commercial dairy at Maha‘ulepu – a Federal Environmental Impact Statement – would provide a more extensive and unbiased environmental scrutiny; than the State of Hawaii Environmental Impact Statement process.

That Hawaii Dairy Farms LLC is preparing its own Environmental Impact Statement; paying Group 70 International, Inc. to prepare the EIS; is likened to: “The fox guarding the henhouse”.

The magnitude of the significance of Maha‘ulepu, with Makawehi carbon dated at six million years – is priceless beyond comprehension; and allowing a commercial dairy there is sacrilegious!

Mahalo for your collective common sense! If Hawaii Dairy Farms LLC really wants to construct a dairy – do it elsewhere… NOT at Maha‘ulepu.

I look forward to receive a copy of the DEIS – Mahalo for your valuable time and consideration in this matter.

Sincerely with ALOHA,

Bonnie P. Bator and ‘Ohana
their respective fields of study. For this project, Group 70 is preparing the Hawai‘i Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

**FLORA AND FAUNA:** Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed for listing under Federal or the State of Hawai‘i’s endangered species programs, located onsite within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plants species will occur as a result of the dairy.

A botanical survey of the dairy property was conducted in August 2014 by ACCOS Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened or proposed for listing under either Federal or the State of Hawai‘i endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhāulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kauai may overfly the site. The endangered Hawaiian goose, nēnē was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kōloa area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to project-specified areas, marking tall structures and fencing with white visibility polytape, limiting nighttime lighting, and shading any outside lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Exisiting conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waima‘u volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāulepū Valley and the HDF site ranges from 0.15 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 200 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic materials.
material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaii’s Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site well, existing Māhāulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no area will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the volcanic aquifer layer, which is the source of potable water. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DEEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hā`upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:**

The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pesticide Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:**

The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Mākahawi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilise the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could
be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CBW noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase from more than three tons DM per acre with daily establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kūloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 36,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean water. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.
ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEB Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Renoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: search "Hawai'i Dairy Farms"; [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

February 18, 2015

Group 70 International
925 Bethel Street, 5th Floor
Honolulu, HI 96813-4307
Attention: Planning Consultant, Jeffrey H. Overton, Principal Planner
(EDF@Group70intl.com)

State of Hawai‘i Department of Health
Environmental Planning Office
919 Ala Moana Boulevard, Room 312
Honolulu, HI 96814
Attention: Laura McIntyre, Program Manager
(laura.mcintyre@doh.hawaii.gov)

Subject: Opposition to Hawai‘i Dairy Farms in Ka‘u‘i/Ko‘ola‘u District

Dear Jeffrey and Laura,

Thank you for Jeffrey’s January 21 letter regarding the Hawai‘i Dairy Farms. We appreciate the opportunity to participate in the environmental review process by providing our comments of opposition to you, postmarked before February 22.

How inappropriate to allow a large industrial scale dairy in the proposed location in Koolaupoa because, if approved, this massive dairy farm would threaten:
- rich native Hawaiian cultural practices
- archaeological sites
- a fragile environmental ecosystem home to endangered and threatened plant and animal life
- the south shore residents and tourist’s health and well being due to the volume of toxic waste (manure and urine) deposited and pumped onto pastures so close to the county wells providing drinking water for all of Po‘ipu and much of Kōloa
- the economic damage to the south shore as tourism

Please do the right thing by weighing the consequences and considering not only the near-term negative impacts but future impacts for generations to come. We hope you conclude as we have to NOT SUPPORT Hawai‘i Dairy Farms. You can keep us informed, address our concerns and/or reach us via email at kauailbaycondo@gmail.com.

Thank you.

Greg & Shelley Bay
Po‘ipu Sands owners
kauailbaycondo@gmail.com
May 26, 2016

Greg & Shelley Bay

kaushaymdo@gmail.com

Subject: Hawai‘i Dairy Farms

Environmental Impact Statement Preparation Notice

Māhāulepū Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Greg & Shelley Bay:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

Dairy operations with 700 or more mature dairy cows require additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

ARCHAEOLOGICAL AND CULTURAL: The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flame system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising, given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic-era cultural materials associated with the many Land Commission Awards in the project area are non-existent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bonework was found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhāulepū Ahupua‘a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

FLORA AND FAUNA: Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanic survey of the dairy property was conducted in August 2014 by AECONS Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened or proposed for listing under Federal or the State of Hawai‘i’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are...
included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plant species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhāulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kauai may overfly the site. The endangered Hawaiian goose, nēnē was also seen on the site. State Division of Forestry and Wildlife Biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kīloa area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing at project-specified areas, marking tall structures and fencing with white visibility polytape, limiting nighttime lighting and shielding any outside lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

DEMографIC AND ЕCONомIC: The potential impacts of Hawaii’s Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, masons, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.
WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawaii Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Koolau area was built by Napali formation lavas of the Waimanu volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Mahahulepui Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Koolau series. The alluvial material is highly weathered lava and is comprised of dark brown to black alluvial and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in feet per day. It is a measure of how easily water will move through the ground. The hydraulic conductivity of the alluvium that underlies Mahahulepui Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Koolau-Poipu region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Mahahulepui may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further details.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaii Department of Health Milk Quality Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use would be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Mahahulepui 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Mahahulepui 14 well and the County’s Koolau well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Mahahulepui Valley, HDF established a 1,000-foot setback surrounding the Koolau F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kauai community.

Regional Water Demand: The adjacent, developed Koolau-Poipu region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kauai will increase county-wide by 17,300 residents by 2030. The South Kauai population is estimated to reach 16,955 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kauai region (the Koolau-Poipu-Kalaheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Mahahulepui Surface
Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā'ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā'ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hā'upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā'ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua’i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococci to the State Department of Health (DOH) and provided its data; however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā'ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococci in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhā'ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua’i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator level found in ditches running through Māhā'ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Library" (http://health.hawaii.gov/cwb).
To provide perspective, nutrient inputs from the adjacent Kiloa-Po'ipu region were also calculated. Nitrogen input to the marine environment in the Po'ipu region is calculated to be 38,510 pounds annually, or 35 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipu region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment.** An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiolii Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kauai community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
February 21, 2015

State of Hawaii
ATTN: Laura McIntyre
Department of Health
1250 Punchbowl Street
Honolulu, HI 96813

RE: Response to EIS for Hawaii Dairy Farms (HDF)

Aloha Ms. McIntyre,

Pertinent Points of Concern:
1) Property owners in Poipu area – property values and resale will be affected
2) We use the ocean for exercise classes and play
3) Effects of dairy on tourism
4) Published scientific documentation of negative effects of dairies on land, streams, ocean in New Zealand and various states on mainland USA
5) Hawaii Dairy Farms calls this project a "zero-discharge" endeavor – isn't that a misnomer?

The above items each need to be addressed in detail in Hawaii Dairy Farm's (HDF) EIS. Of particular importance is the noticeable short shift given by HDF to economic and social consequences. Also, I am concerned that the EIS does not sufficiently address alternative locations. It would seem that a genuine exploration of alternative locations should, at a minimum, consider three other sites which should be better developed and seriously explored by a qualified Environmental Engineering Firm familiar with Animal Feed Operations and the known impact they have on the environment.

We are homeowners and year-round residents in Poipu, Kauai, residing a short distance from the Grand Hyatt Hotel to the east and Poipu Beach Park to the west. We've been living on Kauai for twenty-eight years and in the Poipu area since 1997. We moved to Kauai from the mainland because we were drawn to the climate, water (ocean and rivers), slower pace of life, friendly people and the feeling of a community that truly cared about preserving all of its natural resources. As long as we've been living here there has been a very active group who have aggressively advocated maintaining Malaena Beach and Valley called Malama Mahaulepu, indicating that that area is very special in many ways.

While we're not against Island sustainability, we don't think that it should be attained at the expense of our protected (so far) natural resources and healthy way of life. Many professional people, Southshore residents and businesses have expressed their concerns regarding the implementation of an Industrial dairy in a pristine and culturally important valley that is located very near one of Kauai's top tourist destinations and upwind to those businesses and residences alike.

We are concerned about the odors and biting flies that would definitely come our way most of the year as we are in the tradewind path that comes from the Mahaulepu direction. What is Hawaii Dairy Farms (HDF) going to do to keep that from driving the tourists and homeowners away from the Poipu area? The Grand Hyatt Hotel and many of the condominium resorts are bound to lose business. Residents may choose to move away and will have a difficult time selling.

I teach water classes and my husband surfs in the ocean at Poipu Beach. What is Hawaii Dairy Farms (HDF) going to do to guarantee that they won't add to the pollution to an already polluted stream,

ATTN: Laura McIntyre

Page 2

Waioipi, running through the valley property down to the ocean, thus raising levels of contamination that will kill the reefs and marine life and make the ocean inhospitable for humans to exercise and play in? Like the tradewinds the ocean currents flow from Mahaulepu toward Shipwreck Beach in front of the Grand Hyatt Hotel and on down to Poipu Beach.

At the first meeting that Hawaii Dairy Farms (HDF) hosted in February 2014 at the Koloa Neighborhood Center for the Southshore community, we were informed that HDF was basing their dairy farm on the New Zealand method of dairy farming. It has been scientifically proven and publicized that the New Zealand method has greatly polluted the streams and ocean thus forcing New Zealand to spend millions (or more) dollars taking many years to try to clean it up – a work in progress that has yet to be accomplished. Why does HDF insist on having an industrial dairy in one of the most inappropriate locations on Kauai for this sort of business? Is HDF prepared to be spending millions (or billions) of dollars over the years cleaning up after themselves when the water, land and air have been compromised due to the “normal” operations of such an endeavor?

Wouldn't it be intelligent of Grove Farm, Hawaii Dairy Farms and Ulupono Initiative principals to be proactive and avoid all those problems from the outset by putting their dairy in another more appropriate location on Kauai?

We respectfully submit this letter with heavy hearts.

Sincerely,

Allan and Charlotte Beall
1641 Makanui Road
Poipu, HI 96756
(808) 742-2487
jamsbeall@cs.com

RETURN RECEIPT REQUESTED
Dear Charlotte and Allen Beall:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will continue the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any feed; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways

Charlotte and Allen Beall
May 26, 2016
Page 2 of 8
and cow races are designed to provide a comfortable path under hoof. The management practices applied by HDF maximize grass as the other partner ranches as needed for animal health and dairy productivity. This will cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd or birthing/core dairy cows. For more information on off-site herd management see Section 4.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be preserved and non-irrigated to control those species. No federally or state listed endangered or threatened species found on site is provided in EIS Section 4.11 and Appendix B. Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation depending on the actual irrigation needs of the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The PESTS:

- **Drosophila**: A fly that lives off of decaying organic matter and has adapted to agricultural settings. It is considered a pest because it can spread diseases and contaminate food. HDF will control this species by composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for endangered species. HDF has not inject cows with bovine growth hormone, referred to as rBST or rBGH.
production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. The HDF project, with an established herd of up to 699 mature dairy cows, would be created on O'ahu.

The HDF project would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State when the 699 cow herd is established, the economic weathering of the economy is improved. Both dairies are currently supplied from off island. Additional employment generated by a possible expansion to accommodate the potential of the 699 cow dairy, and the projected 2,000 cow dairy, would be expected to average about 16 jobs on Kaua'i and 8 on O'ahu. Construction employment would be expected to average about 210 jobs per year during the construction period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 additional and indirect jobs would be expected to average approximately 12 jobs per year during the operations. No noticeable odors, flies, noise, waste or water discharges will impact nearby recreational activities, guests in nearby resorts, or diminish property sales or value in the area.度假村或住宅区。因此，奶牛场不会对居民产生负面影响。

Considering the climate is a significant factor in the area (see DEIS Section 4.1, Climate). The full air quality impact of the HDF project was modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 of the project would be expected to average approximately 12 jobs per year during the construction period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 additional and indirect jobs will be created on O'ahu.

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DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM$_{10}$ and PM$_{2.5}$) measured on the island of Kaua’i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM$_{10}$ is 2.01 μg/m$^3$, well below the State standard of 150 μg/m$^3$. The estimated concentration for PM$_{2.5}$ is 0.23 μg/m$^3$, well below the Federal standard of 35 μg/m$^3$ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawaii Dairy Farms”: http://tinyurl.com/OEQC2AUAJ

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Gentlemen:

I wanted to express my concern and the need to address not only the health concerns, but also the potential economic risk of a dairy farm in Mahaulepu.

We have been homeowners in Poipu since 1979 and have deep concerns about the impact of a Dairy Farm so close to a resort area. I grew up in an area of large cattle ranches (non-dairy) that had about the same density of use as proposed in this case. The ranchers always referred to the persistent malodorous aroma as “the smell of money”!

The prevailing wind comes from the east-north-east which will result in blowing smells towards Mahaulepu Beach, the Hyatt and our residential area. This might remind me of my childhood, but certainly not in a pleasant way! The amount of manure and urine that will be produced by the cattle will leave a lingering odor that cannot be mitigated.

The potential economic risk to the tourist economy of Poipu, not to mention the potential health risk of runoff impact on the nearby beaches far exceeds the potential benefit.

The collection area for manure during milking is designed for a “25 year rain event”. If anything occurs in excess of this there would likely be direct runoff into the ocean. Just a few incidents of beach closures as the result of inadvertent runoff could have a devastating effect on the area.

Surely there are other agricultural areas on Kauai where an operation such as this could be located that would have far less potential environmental and economic impact.

Sincerely,

Craig Beam

May 26, 2016

Craig Beam
Craig.Beam@cbre.com

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001: 001 portion

Dear Craig Beam:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

NATURAL HAZARDS: The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhā‘ulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai‘i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone. The Kaua‘i and Nī‘ihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands.

Although they occur infrequently, Kaua‘i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management
personnel in the Māhā'ulepū region during and following the hurricanes that affected Kaua'i in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhā'ulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua'i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai'i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, rofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 15 jobs on Kaua'i, and 9 on O'ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 20 would be on Kaua'i.

The HDF project would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai'i Island), approximately 10 percent of Hawai'i's milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. Ongoing dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua'i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to ongoing dairy operations would be created on O'ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai'i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua'i, and 2 indirect jobs on O'ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua'i and another 8 indirect jobs on O'ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.
GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kāpaa area was built by Napali formation lavas of the Waimāna volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā'ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kāpaa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā'ulepū Valley and the HDF site ranges from 18.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kāpaa-Po'ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā'ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā'ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā'ulepū 14 well and the County’s Kāpaa W ell, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā'ulepū Valley, HDF established a 1,000-foot setback surrounding the Kāpaa W ell in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kāpaa-Po'ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DREDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2030, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kāpaa-Po'ipū-Kalaheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā'ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā'ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā'ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā'ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.
Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built

...the National Pollutant Discharge Elimination System (NPDES) — Construction buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrient from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlour is insufficient to meet the agronomic need of the pasture in key locations; sand bags barriers in swales; and geo textile filter fabric and grass crop with the committed herd size of 699 mature dairy cows, and sediment logs around drain inlets.

The groundwater and surface water analysis conducted for the Environmental Sanitary Survey found no significant impact to the ditch from any activity that could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. Such discharge to the channel could occur during such weather events.

The groundwater nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year) and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the manure contributions would be limited to periods of the major rainfall over 0.8 inches. The groundwater nutrient budget is calculated as 38.510 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nitrogen input to the region is estimated from HFF, the Poipu region, and is not an inviting recreational body of water utilized by people. The HDF Sanitary Survey completed Part I of its report: The Waiopili Ditch Sanitary Survey, Kauai, Part I

The dairy facility, estimated potential nutrient pass-through to recreation waters at the terminus of Waiopili Ditch, or of surface waters in the increase more than three tons DM per acre, and Section 4.23 of the EIS provides additional information.

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Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waioipi Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CBW, dairy neighbors and the local Kauai community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EE sections 419 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day. Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral grazing system will be on pasture 22 hours each day and will spend two hours in two separate milking cycles - moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kauai, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy feeders and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be...
dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OECD website at the following URL, search “Hawaii’s Dairy Farms”: http://tjlawurl.com/OECDKAILA

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AIA, LEED AP
Principal Planner

February 20, 2015

State of Hawaii – Department of Health
Laura McIntyre, Environmental Planning Office
919 Ala Moana Blvd., Room 312
Honolulu, HI 96814

Re: Hawaii Dairy Farms, Kauai

Aloha Ms. McIntyre:

It is my understanding that I should address any comments I have to you in regards to the EIS filed in connection with the proposed 2,000 head dairy for the Maka'alepu Valley along the south shore of Kauai. I am a resident of the Poipu area and homeowner residing along Poipu Road near the Grand Hyatt Kauai Resort, within 1.5 miles of the property proposed for this use. If the dairy were to be developed as planned, the potential for exceedingly negative impacts to the Kolos/Poipu area would be eminent. This plan will place over 4 head per acre upon mostly clay soil types which cannot withstand such an intensive land use. These soil types cannot and will not hold the amount of nitrates and phosphates from this size of herd and the runoff will result in considerable pollution to not only the oceans fed by streams in the area such as the Waiopili, but also to the potable drinking water provided by Kolos wells within 750 feet west of the proposed dairy site. My research and knowledge of traditional agriculture and Animal Operations (AO) as a commercial and agricultural appraiser in Hawaii and in the Midwestern states of Iowa and Illinois, leads me to the conclusion that the dairy plan proposed by Hawaii Dairy Farms requires acreage in the thousands, not 578 acres as proposed.

The Poipu area is home to world class beaches and resorts that would be heavily impacted by ground water and ocean pollution emanating from surface runoff to the ocean and seepage into the potable water supply. The Kolos/Poipu area alone (census tract 15U070406.03) accounts for 47.5% of all annual hotel and lodging revenue on Kauai amounting to over $110 million in annual revenue. This area also contributes more than 23% of the County’s total real property tax revenue or about $150,000,000 annually. Considering that the US Census classifies 80% of residential properties in the Kolos/Poipu area as “seasonal”, and nearly 60% of all real property tax revenues in the area come from the vacation rental and hotel & resort tax classes, the local economy is sure to be especially impacted by this incompatible land use. In addition to ground water pollution and ocean pollution, odors, flies and noise emanating from the dairy would detract from what was once the allure of Poipu as a world class visitor destination, or as a desirable place to live. Occupancy rates at hotels and the 86% of housing units classified as “seasonal” would plummet. The EIS must not only study the impacts to the environment, but must also study the potential impacts to the Poipu visitor economy which will be significantly impacted by the environmental consequences of such an intensive land use in the Maka’alepu Valley.

Mahalo for your consideration to my concerns,

Curtis J. Bedwell, MAI
PO Box 1310
Koloa, HI 96756
Ph: (808) 755-5883
curtisbedwell@gmail.com

cc: Hawaii Dairy Farms, LLC
P.O. Box 1690
Koloa, HI 96756-1690

cc: Group 70 International, Inc.
925 Bethel St. 5th Floor
Honolulu, HI 96813
The Environmental Impact Statement (EIS) Preparation Notice (EISP), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1. Coastal agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water is discussed in Draft EIS Section 3.5, Pasture Management.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai’i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may be given to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai’i Dairy Farms (HDF) will establish and operate a sustainable, pastoral, rotational-grazing dairy farm in Māhā’ulepū Valley on the island of Kaua’i to produce fresh, locally available nutritious milk for Hawai’i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “molds”, mimicking the natural social order of bovines. Cows spend 24 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the
energy expended by the mature dairy cows as they graze or are transferred to and from the pastured area. The committed herd size of cattle at HDF is 699 mature cows. Animals in various stages of lactation and rest will be transferred between HDF and smaller partner ranches as needed for animal health and dairy productivity. This will include cows or calves being moved on or off the farmland to protect the water quality of the drainage ways throughout the site. Existing vegetation within the setbacks will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected to be once per day. Cow lactating follows the birth of calves. Newborn calves will be raised on their dams and provided essential carbohydrates and nutrients for health and growth; they can be provided with milk from the dam or by Colostrum Kit. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibits milk from cows with active infections from entering the dairy system is required. Analyses of milk from all of the farms where the dairy will be located will be conducted to verify no antibiotics were used. Soils are a core principal behind establishment of the NRCS, which was established in 1935 to provide science-based tools and standards for land and water resource management. NRCS guidelines are a part of the soil conservation practices and should be included as Appendix F of the Draft EIS. The NRCS Conservation Practice Standard 590, Nutrient Management, applies to dairy operations, commercial fertilizers, organic by-products, waste water, compost, and animal by-products. The NRCS可是 conservation store, which is the practice of managing the nutrient, water, and land resources to ensure the sustainability of the agricultural system. The NRCS可是 conservation store, which is the practice of managing the nutrient, water, and land resources to ensure the sustainability of the agricultural system. The NRCS可是 conservation store, which is the practice of managing the nutrient, water, and land resources to ensure the sustainability of the agricultural system. The NRCS可是 conservation store, which is the practice of managing the nutrient, water, and land resources to ensure the sustainability of the agricultural system.
Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalihi Clay at 32 percent, Kāne'ia Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for soils formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as "poorly drained", and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas "drainage" refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential for impacts on waterbodies. In this way, "poorly drained" soils may represent less risk of nitrate and nitrite leading to associated waterbodies than "well drained" soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai'i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy's focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing season. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i’s Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasc Electric Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, masons, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local Fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the
committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable water used for milk production, both in the milking operation, and for feed production. The shallow groundwater within the alluvium serves as the source of potable water for the dairy. The Potable Water Demand: The State Department of Economic Development and Tourism (DBEDT) projects the Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa-Po‘ipū-Kalāhe‘o districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable water used for milk production, both in the milking operation, and for feed production. The shallow groundwater within the alluvium serves as the source of potable water for the dairy. The Potable Water Demand: The State Department of Economic Development and Tourism (DBEDT) projects the Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa-Po‘ipū-Kalāhe‘o districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and
visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāulepū Road. This ditch, named Waiōpili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery.

Surface Water Quality: The Kuʻai Chapter of the Surfrider Foundation began collecting water samples in Waiōpili Ditch near the bridge accessing Makaawahi Cave Reserve in April 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiōpili Ditch, or of surface waters in the Māhāulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiōpili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāulepū and adjacent watersheds. DOH conducted water sampling within the Waiōpili Ditch and area upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiōpili Ditch Sanitary Survey, Kuʻai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāulepū Valley. The dense canopy along the makai end of Waiōpili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiōpili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received categorical assurance/quality control requirements, and it could not be used for regulatory

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer and pasture application of manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.
The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Po’ipū region were also calculated. Nitrogen input to the marine environment in the Po’ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po’ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopilī Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
To: Laura McIntyre  
State of Hawaii, Department of Health  
Environmental Planning Office  
1250 Punchbowl Street  
Honolulu, HI 96813

To: Jeff Overton  
Group 70 International, Inc.  
925 Bethel St., 5th Floor  
Honolulu, HI 96813

To: Hawai‘i Dairy Farms, LLC.  
P.O. Box 1690  
Kōloa, HI 96756-1690

From: Betty J. Bell  
2895Milo Hae Loop  
Kōloa, HI 96756

February 23, 2015

I have been a south shore realtor for 35 years and before that a pharmacist for 14 years on Kauai. I have two residences, my home and a rental providing my retirement income, both in Poipu and the immediate vicinity of the proposed dairy. I cannot understand how anyone would consider spoiling the pristine area of Mahaulepu, with a project that is hazardous to the island and our health, and would like to be kept informed of all stages of the Dairy EIS.

To begin, I would appreciate an evaluation of the company chosen for the EIS, Group 70 International, and whether they have any experience in environmental studies and whether they can present unbiased reports, given their investment in the Hawaiian Dairy Farms (HDF) building design. Experts can be bought and then the EIS may not protect the public interest. How can we be assured that the EIS will lead to an impartial evaluation?

Dairy Farm pollution is of major concern in other states and has not been resolved in a timely fashion by the EPA. Since the Dairy is modeled on New Zealand examples, the EIS should also model the clean-up process, forecast as millions or billions for similar coastline areas, and provide bonds for those costs, which will otherwise be the burden of state, county, and taxpayers.

Whether the agri-business or any other, one needs to make a profit without deleterious effects on others. The south shore includes Kauai’s major hotel and condominium resorts, expensive vacation homes and residences, popular beaches and other tourist activities. The tax base of this area depends upon its popularity, beautiful outdoors and ideal weather conditions, all of which would be severely impacted by a dairy farm close by, likely to be much more significant than any revenues from the proposed Dairy. Trends show that an intrusion like this one into resort areas, is likely to decrease property values by 25% to 40%, and make close by homes unmarketable. Our entire Kauai economy would be affected when tourists “get wind of” the smell and spoiled beaches on the south shore. The EIS needs to specify how these effects would be avoided, because pollution of the ocean and nearby beaches seems inevitable with the current HDF plan and insufficient waste management plan.

First and foremost, another site should be located for the Dairy where the entire operation can be accommodated, including processing of the milk. The Mahaulepu area should only be considered for other agricultural use, and other crops which would not disturb the natural flora and fauna already established. Cattle or any livestock would destroy much of the natural terrain and the species it currently supports. The special zones of Mahaulepu, and marine environment need protection, especially from the existing streams and waterways flowing into the ocean. Monk seals, for example, come to the Mahaulepu shoreline yearly, have their pups there, and return for generations. They are particularly prone to bacteriological infection. How will the runoff affect their limited numbers? The zoonotic diseases carried by cattle would effect humans and other mammals, from the waste runoff, insects and wind carrying bacteria for miles to surrounding areas. The EIS should include a plan to control all contamination of the surrounding environment, including all vectors of disease. The most obvious need is to control the biting black flies without the use of more chemical pesticides.

The EIS needs to evaluate, prevent and plan control of algae blooms created by even a slight change in ocean temperature or acidity, likely to be the effect of this many cows in one area. The cumulative waste for one month is estimated at 3 million lbs of manure and 210,000 gallons of urine for 699 cows (HDF Plan, 143 lbs/cow/day x 699 cows x 30 days = 2,995,710 lbs manure each month) and 8.5 million lbs of urine for 2000 cows, with all waste remaining on the site. Does the plan allow for that much ongoing monthly accumulation of untreated waste in one location? In comparison, it is about 5 times more defecation than that of the entire Kauai human population, which we would certainly not allow to be deposited untreated on the surface of any one area.

Air, land, and water contamination by cattle waste, nitrates, phosphates, ammonia and methane is unacceptable. The amount of methane produced can be cumulative in the environment and reduce the ozone layer, to produce a hotter, dryer climate. The 286,000 pounds of manure a day will not be absorbed by the clay soil efficiently. With winter rains and snow, the absorption will be less and runoff to the ocean more likely. The EIS must speak to the amelioration of the air, water and soil with scientifically determined testing by qualified disinterested specialists and the Department of Health.

In addition to ground water pollution and surrounding well pollution, the EIS needs to speak to the availability of water sources for the cattle. In my understanding that the 1957 (Huleia) diversion of headwaters to the Mahaulepu watershed was to be removed so that water is restored to the original flow, which would probably leave an insufficient supply for cattle. The right and title to water supply is in question, along with Hawaiian rights and state property. In any case, the EIS process should determine what encumbrances the Dairy use of water places on Kauai’s other uses of it’s water supply.

Thank you in advance for a response to my comments, Betty J. Bell
Betty Bell
May 26, 2016
Page 2 of 14

Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy cows’ diet. HDF’s intent to utilize a locally-produced feedstock – grass – for the dairy cows is demonstrated in the HDF EISPN as a “zero-discharge, grass-fed dairy.” The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed,” the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

**GROUP 70 OBJECTIVITY:** 

Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai‘i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai‘i Revised Statutes and the “Environmental Impact Statement Rules” (Chapter 200 of Title 11, Hawai‘i Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State and Federal agency. On numerous past EIS projects, the Hawai‘i Chapter of the American Planning Association has recognized Group 70’s professional work with Chapter awards for excellence in environmental planning. Part of the EIS scoping process involves Group 70’s experienced team of technical sub consultants that are well-qualified and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai‘i Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

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food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient pasture management. Refer to Section 3.5.3, and Draft EIS Appendix D.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups, allowing for light and fresh air. The gently sloped paddocks, walkways and cow races minimize the risk of pasture damage while allowing cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups, allowing for light and fresh air. The gently sloped paddocks, walkways and cow races minimize the risk of pasture damage while allowing cows to move about freely, and to lie down and rest, which is part of the digestion cycle.

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included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plants species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhāulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kauai may overfly the site. The endangered Hawaiian goose, nēnē, was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kōloa area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to project specified areas, marking tall structures and fencing with white visibility polytape, limiting nighttime lighting, and shading any outside lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (DEIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. Ongoing dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to ongoing dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $164,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 44 million gallons (367,19,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For ongoing operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($75,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.
WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kīlauea area was built by Napali formation lavas of the Waimānalo volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Calfed, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kīlauea series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kīlauea-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanicseries and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kīlauea F well will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kīlauea F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy’s neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kīlauea-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kīlauea - Po‘ipū - Kālaheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface
Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 15-feet from the top of drainageways (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.
To provide perspective, nutrient inputs from the adjacent Kīlauea-Pōipsoid region were also calculated. Nitrogen input to the marine environment in the Pōipsoid region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pōipsoid region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input to the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacterial constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feed stock (Objective 3); and would not utilize requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term
employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.

- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

- The planned dairy location meets the requirements of minimum land area, soil properties, site conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawai‘i Dairy Farms”: [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
February 21, 2015
Laura McIntyre
State of Hawaii Dept of Health
1250 Punchbowl Street
Honolulu HI 96813

Group 70 International
925 Bethel Street 38th Floor
Honolulu HI 96813

Jeff Overton
Hawai‘i Dairy Farms
PO Box 1690
Koloa HI 96756


Dear Ms. McIntyre,

I was born on Kauai. My son Isaiah was born on Kauai two years ago today. My son suffers from asthma. The air pollution from a dairy of any size will cause respiratory harm to my son. My son’s mother works in a Poipu restaurant downwind of the proposed dairy site.

We are concerned about my son’s health and our economic welfare if a dairy operates north east of Poipu. How will we pay our mortgage payment if my girlfriend’s income falls? Who will come into her open air restaurant to order food if all they can smell is terrible dairy cow odor.

The certain air pollution and economic harm caused by an industrial dairy in Mahaulupu valley all need to be addressed and answered by the EIS.

Sincerely,

Masai Bell

May 26, 2016

Masai Bell
1960 Nana Pali Rd
Lihue HI 96766

Subject: Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Masai Bell:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the
Under the Clean Air Act of 1970 (CAA), the Environmental Protection Agency (EPA) regulates both large and small sources of air pollution, including fugitive dust and methane emissions. The EPA has established National Ambient Air Quality Standards (NAAQS) that are as strict or, in some cases more strict than the Clean Air Act of 1970 (CAA), that apply to Hawaii. The State of Hawaii also has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the Federal standards. These standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitation industry. With only two dairies remaining in the State (both on the Hawaii Island), approximately 10 percent of Hawaii’s milk is locally produced. This would double local milk production currently supplied by operational dairies on the Island of Hawaii.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals are fed; PM is not measured from “pasture” components (which are air-quality relevant) of the HDF operations. For on-going operations at the committed herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on Oahu.

For the anticipated 2,000-mature dairy cow herd, approximately 3,300,000 gallons of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawaii. An additional 4,600,000 pounds of milk would be produced. This would triple local milk production currently supplied by operational dairies on the Island of Hawaii.

The potential increase of 9 jobs for on-going operations at the contemplated herd size is negligible. The estimated concentration for PM 10 is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM 2.5 is 0.39 μg/m³, below the Federal standard of 3.5 μg/m³ (see Draft EIS, Sections 4.18 and 4.19 and Table 4-19.2).

AIR QUALITY: As part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor potential, emissions, and air quality parameters. As a result of the HDF project, the dust and odor potential would be negligible. No emissions would occur from the contemplated 2,000-mature dairy operation.
system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity/mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OIEC website at the following URL search "Hawaii Dairy Farms", http://oiec.state.hi.us/102008\A11A Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

February 22, 2015

Laura McIntyre
State of Hawaii - Department of Health
1250 Punchbowl St
Honolulu, HI 96819

Re: Proposed Hawaii Dairy Farms Environmental Impact

I am writing to express my opposition to the proposed location of HDF’s operation in the Mahanae Valley, Kauai. Please add me to the growing list of concerned south shore residents that need to be kept informed of the status of the state’s actions regarding HDF.

The proposed dairy farm is adjacent to the ocean, an environmentally sensitive area, already identified as an area that needs substantial remediation to achieve eco balance.

The dairy would substantially affect the economic and social welfare and public health of the community with negative impact to tourism, degradation of a pristine and culturally relevant historical site, and with harmful pollution to water tables, streams and the ocean evident.

The state needs to carefully assess this project as to the effects of public health and possible degradation of environmental quality. I am counting on your agency to effectively administer the EIS that will demonstrate that this plan is ill conceived in the current planned location.

Mahalo for your attention to this matter,

Sincerely,

Roger Bishop
1172 Pua Mea St.
POB 173
Kalaheo, HI 96741-6173
808-320-3783
roger_bishop@yahoo.com
May 26, 2016

Roger Bishop
Roger_bishop@yahoo.com

Subject: Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice
Māhāulepū Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Roger Bishop:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

Your comments were received by the State of Hawai‘i Department of Health Environmental Planning office. The Department of Health forwarded a copy of your comments to Group 70 International in order to be included in the Draft Environmental Impact Statement (EIS) analysis. This letter was prepared in response to your comments.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhāulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISP), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed.” The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture or a forage-based diet. Due to the evolving definition of “grass-fed,” the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups...
known as “mobs,” mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Wai Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation water and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for Hawaii is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows last milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulēpī site and provided essential colostrums and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The submitted herd size of 699 mature dairy cows at the Māhā‘ulēpī site applies to mature dairy mature cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and increase the beef market in Hawaii with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd. Heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rbST or rBGH.

ARCHAEOLOGICAL AND CULTURAL: The Hawaii Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flame system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intense sugarcane cultivation on the valley floor. Even historic era cultural materials associated with the many Land Commission Awards in the project area were non-existent, as explored through survey and subsurface exploration.
The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhāulepū Aha'pua'a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103994, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plachic Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 0 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. Going-on operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. A dairy project 6 indirect jobs related to ongoing dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,219,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Nāpali formation lavas of the Waimea volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa...
The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is barred beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā'ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā'ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.33 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā'ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā'ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā'ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Poipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i region (the Kōloa-Poipū, Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā'ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā'ulepū watershed. The HDF site is located on the bottom-land of the upper Māhā'ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha'upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā'ulepū Road. This ditch, named Waipālī Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and...
prohibiting leaking or poorly-maintained construction equipment and machinery.

Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waipili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waipili Ditch, or of surface waters in the Mâhaulépule Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waipili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Mâhaulépule and adjacent watersheds. DOH conducted water sampling within the Waipili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waipili Ditch Sanitary Survey, Kauai, Part I. The Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Mâhaulépule Valley. The dune canopy along the makai end of Waipili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waipili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HFD received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, US Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fencelines and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 423 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Mâhaulépule will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HFD nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year) and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HFD. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Resource Consultants, Inc. (MRCI). Surface water from the Waipili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.
The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kauai community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

From: Mehana Vaughan <mehanav@gmail.com>
Sent: Sunday, February 22, 2015 9:31 AM
To: epo@doh.hawaii.gov; HDF
Cc: greg@malamamahaulepu.org; blaich
Subject: Mahaulepu Dairy EISPN comments
Attachments: EISPN- Comments Blaich.pdf; EISPN- Comments Blaich.pdf

Aloha,
Thank you for this opportunity to comment on the EISPN for the HDF proposal.
Beryl Blaich
blaich@aloha.net
State of Hawai‘i, Department of Health
Environmental Planning Office
Attention: Laura McIntyre
919 Ala Moana Blvd., Room 312
Honolulu, HI 96814
epo@doh.hawaii.gov

Group 70 International
Attention: Jeff Overton, HDF Project
925 Bethel St., 5th Floor
Honolulu, HI 96813
HDF@Group70int.com

February 20, 2015

Dear Ms McIntyre:

I am glad and grateful that HDF has decided to do an Environmental Impact Statement (EIS). I expect that the extensive questions and concerns that have been raised by the public for the past year about the proposed dairy will be thoroughly and scrupulously addressed and that, if needed, stringent mitigative measures will be implemented.

I am commenting as an individual whose gravitation to Māhā‘ulepū is because of its beauty, simultaneously expansive yet intimate. While the ocean is ever stunning, and changing, the majestic constant presence of Hā‘upu permeates Māhā‘ulepū and its surroundings with calm. Whenever there, I leave refreshed by this strangely tangible tranquility. My experience is common.

I have been actively involved in Mālama Māhā‘ulepū for fifteen years, and I have paid considerable attention to this proposal. This letter describes the history and credibility of Māhā‘ulepū conservation initiatives, offers suggestions on what the EIS must cover and provides comments on the EIS Preparation notice.

I. History and Credibility of Māhā‘ulepū Conservation Initiatives

Non profit Mālama Māhā‘ulepū works to protect the irreplaceable natural and cultural resources of Māhā‘ulepū and to sustain the experience of the place as an undeveloped area with compatible agriculture, education, cultural practice and recreation. By “compatible” we mean that these different land uses must be able to co-exist without degrading each other.

It is imperative to conserve Māhā‘ulepū not only because it is the last undeveloped coastal area of Kaua‘i’s South Shore, but because the collected resources at Māhā‘ulepū offer an intact cultural landscape. Mālama Māhā‘ulepū knows that conservation depends upon the willingness of the landowner and that Grove Farm Company must be compensated for any land or entitlements given to public purposes. Moreover, the group believes that conservation should be an ongoing collaborative and creative effort.

The significance of Māhā‘ulepū has been officially recognized by government at the County, State and Federal levels, as well as by land trusts. In 1992, the Office of State Planning recommended expanding the conservation district to include 247 acres of coastal agricultural land as well as the slopes around three cinder cones Pa‘a (Puu Wanawana, Puu Hunihuni and Pu‘ihi) because of the area’s geologic features as well as other natural and cultural resources. At that time, the Office of State Planning placed the area in a status of “land bank.”

In 2000 the Kaua‘i County General Plan stated: “This area needs a community-based planning effort that engages the landowner and local community interests, drawing upon the County government, the State DLNR, and various professional experts, as needed. Options for the area include some development in exchange for a park and or preservation areas. Or purchase of the land for a State park.” (GP. 6.4.4.3)

In late 2000, Trust for Public Land explored the possibility of holding an option to purchase Māhā‘ulepū. In 2001, the County Council and the State Legislature passed resolutions calling for a collaborative process to explore preservation options for Māhā‘ulepū. In 2001, Governor Cayetano attempted to purchase Māhā‘ulepū to add to Hawai‘i’s “string of pearls” natural parks.

In 2008, the National Park Service, at the behest of Senator Inouye, conducted a reconnaissance survey of Māhā‘ulepū and surrounding areas including Kipu Kai, the coastal headlands as far as Nawiwiwi, the Huleia River including the Alekoko Fishpond and the Huleia Fish and Wildlife Refuge. The study found that these areas together met the three criteria of significance to qualify for inclusion in the national park system and recommended the next level of NPS study. In 2013, Senator Brian
Schatz and Representatives Colleen Hanabusa and Tulsi Gabbard initiated bills to authorize a Special Resource Study, the next step of national park consideration.

Māhāʻulepū has been the most recommended place to prioritize use of the County’s Natural Resources, Public Access and Open Space Fund. The Hawaiian Island Land Trust has placed Māhāʻulepū on its list of Hawai’i’s most iconic landscapes, a priority for preservation efforts should the landowner be willing. In short, conservation of Māhāʻulepū has been recommended by county, state and federal government agencies, conservation organizations and the public for over forty years, and is far more than a dream.

II. Needed EIS Content

Environmental Value
As it is – largely undeveloped, not urbanized – Māhāʻulepū has public value. The valuable services nature provides humans, including ground water recharge, air and water purification, and maintenance of bio-diversity, are quantifiable and described as “natural capital.” While food production is also certainly a critical benefit of nature’s functioning agriculture can also jeopardize other services depending upon the kind, intensity, practices, location of the cultivation

I hope that the EIS will use the natural capital framework and methodology because it a) characterizes the existing state of the site and its surroundings; and b) compares the impacts of alternative scenarios. Potential resources include Invest, a package of modeling software created by Stanford University scientists to assess the value of an area’s natural capital while helping to analyze the impacts of different land uses on that area. Kamehameha Schools Bishop Estate utilized Invest to plan for the watershed of Punaha’u on ‘Oahu and the software is currently being used to assess ecosystem service values of ahupua’a on both Kaua’i and Hawai’i islands. (www.naturalcapitalproject.org). In addition, scientists at UH Mānoa’s Department of Natural Resources and Environmental Management are creating other ecosystem services based decision support tools developed specifically for Hawai’i. (http://www.ctahr.hawaii.edu/nrem/staff/oleson.html).

Socio-Economic Benefits
Grove Farm Company generously allows daytime public access to Māhāʻulepū. It has become, intended or not, a defacto park and a substantial tourist attraction. Visitors frequently cite Māhāʻulepū as their favorite place on Kaua’i because they loved its undeveloped nature and felt they were discovering a special place. As is, Māhāʻulepū provides extensive social benefits.

The area is an outdoor museum, educational site, and place where stories of the past come alive. Visits to the Makauwahi Cave Reserve are an amazing educational experience whether taking the self-guided or guided tours. School groups and service learning groups of all ages enjoy this on-going research and restoration site.

Māhāʻulepū is a source of physical and mental health. People hike the coast – many routinely – as individuals or in groups like Get Fit Kauai or Sierra Club. The Po‘ipu Resort Association produced a coastal Māhāʻulepū Hike brochure with a map and text, promoted by all the area visitor accommodations. People also hike and ride horseback into Māhāʻulepū. People relish the wilderness experience of the area. For residents, it is an accessible tranquil retreat. Visitors say that Māhāʻulepū is the kind of natural experience they expected in Hawai’i. Artists and photographers relish the mountain to ocean panoramas, the contrast of beach and dunes with jagged limestone.

Economic Benefits
As is, Māhāʻulepū is an economic asset to the southshore and to Kaua’i. Creating a managed conservation area of sufficient size and vision to preserve the resources and natural sanctuary people now experience at Māhāʻulepū requires compensation to the landowner along with their vision and support. There would also be substantial monetary benefits to the landowner and to the community from preservation, including increased value of surrounding open space lands. The current costs of management, including liability, would be avoided.

In addition to providing diverse jobs on site, parks boost the overall economies of their surrounding areas. A National Parks Service study, released in March 2014, reported that the 5.1 million visitors to Hawai’i’s national parks spent more than $314 million on accommodations, food and activities. As of 2012, the park service employs 3723 people in Hawai’i. Kaua’i currently does not have a national park. http://www.nps.gov/socialscience/economic-cfm. However, Māhāʻulepū certainly does not have to become a national park in order to contribute significantly to Kaua’i’s economy. A range of other preservation possibilities would provide the same economic benefit.

Water and Air
The dairy could substantially degrade air and water quality, negatively affecting both habitat and healthy human connection to this place. Substantial long term environmental degradation could foreclose preservation and enhancement of natural features of Māhāʻulepū such as native plants, wetland areas and habitat for Newel’s and wedgetail shearwaters.

I am particularly concerned about the dairy’s effects on both ground and seawater. The dairy could negatively impact drinking water quality and sufficiency. There is great potential for nutrient intrusion into the Kōloa aquifer, area springs, wetlands and ultimately into the Class A ocean waters. Māhāʻulepū is a loved fishing, diving and limu gathering place which Kaua’i families depend upon for both physical sustenance and recreation.
The hydrological study of the EIS is critical to assessing compatibility of the dairy with the area's natural resources and cultural experiences. This hydrological study will need to model the watersheds of both Māhā‘ulepū and Pāta. It should fully depict in maps, diagrams and text the water flows (inputs) into the valley (rains, streams, water from Waïata), the water resources in the watershed (deep and shallow aquifers, subsurface flow, streams), and the outflows of water from the valley (streams, subsurface waters, springs, wetlands).

I am also concerned that the dairy will diminish the air quality of this region by greatly increasing greenhouse gases. Māhā‘ulepū has been described – because of its facing into the tradewinds – as the place where Kaua‘i takes its breath. Over eons, the prevalent winds created the sand dunes that have hardened into the distinctive eolianite limestone headlands sheltering fossils of animals and birds living here before native Hawaiians arrived. The dunes shelter burials, the most significant of Māhā‘ulepū’s cultural resources. While legends offering reasons for the burials vary, respect for them dictates the tranquility and refuge-like nature of being at Māhā‘ulepū.

**Economic Questions the EIS Should Answer**

The financial outlay for this dairy - $13.8 million without an EIS - is large. Considerable financial analysis must underpin this investment. The EIS needs to disclose the full financial picture and business plans for the dairy. Questions include:

- Is HDF solely owned by Ulupono? Or are their multiple investors/partners as early stories about the dairy reported. Who are these entities?
- What are the specifics of the milk contract with Dean Foods/Meadow Gold Hawai‘i?
- What is the anticipated rate of return on investments over what period of time?
- What are the expected annual operating and maintenance costs of the dairy including the cost of boarding calves and resting cows with area ranchers?
- Are there already agreements with specific ranchers? Is HDF giving money to help improve a local slaughterhouse? This is a dairy cost as well as a possible benefit to Kaua‘i.
- What is the expected price of the milk? Will there be a sufficient local market? Will milk be exported? The good goal of providing more local milk is only viable if local people can afford the product. Facing the dairy shelves in the market and given a choice between cheaper mainland milk, middle priced Hawai‘i produced milk and more expensive mainland organic milk, which will people buy? Was a market study done? With surveys and consumer trend analysis? If so, it should be included in the EIS.

It is inadequate to say that the County of Kaua‘i Important Ag Land process determined that 79,000 people will need 2 million gallons of milk a day particularly as less families regularly drink milk.

**III Comments on the EIS Preparation Notice:**

I have some small observations about the EISP which may affect the credibility of the document.

**Definitions:** Some of the basic terms used frequently to describe the proposed dairy, including “sustainable”, “grass-fed and grass-based” and “zero-discharge,” require clear definitions.

“Sustainable” sets very high standards in many minds. To be sustainable implies complete elimination of imported inputs such as feed, fertilizers and even sperm that will be used to impregnate the cows. Sustainable implies minimal use of natural resources, particularly water, with re-use and recycling of resources to create a closed system.

Similarly, “grass-fed” leads people to believe that the cows only food is pasture grass. “Zero-discharge” implies that there will be no pollutants entering the ground or the air, on the site and from the site.

If these understandings of the above words are not correct, clarification of HDF’s definitions of the terms is needed up front in the EIS.

Is ‘kikuyu-guinea’- a variety of grass? Or does the hyphenation of the two types of grasses mean that the pastures will be comprised of both grasses?

The nutrient management plan only discusses the anticipated nutrient production and pasture fertilization regime for ‘kikuyu. **[Soil fertility Recommendations Table 15 p. 666 Waste management Plan, July 23, 2014]** Will the EIS address the change to use of two pasture grasses?

“Long term” should be quantified. The dairy lease is for twenty years and while the dairy may or may not operate for that length of time, potentially detrimental effects of the dairy – particularly from infiltration of nitrogen, phosphorous and potassium into the soils – may occur even after the dairy is no longer in operation.

**Inaccuracies, Simplifications, Deficiencies**

Some of the EISP statements are inaccurate, misleading and could reduce the credibility of the EIS if repeated in that document.

For instance, the statement that the proposed dairy is the “first grass-based” dairy in Hawai‘i is inaccurate. (This is repeated in all the summaries of the project.)
The Meadow Gold dairy at Moloa’a, Kaua‘i, was a grass-based operation as is the Mauna Kea Moo dairy in Hamakua on the Big Island.

The following statement is not accurate:
"Community concern over loss of agricultural land for another proposed resort on the last stretch of undeveloped Māhāʻulepū coastline prompted protection of 1,533 acres of agricultural lands under the Important Agricultural Lands (IAL) provision of the Hawai‘i State Constitution (Article XI, Section 3)."

In the late 1980s, there was community opposition to the development of the Po‘ipu Bay Golf Course on "prime" agricultural lands. However, the State legislated IAL designation process did not occur until fifteen years later. Grove Farm, Co. chose to designate important ag lands rather than having those selected by the County. As supporters of diversified agriculture for Kaua‘i and Hawai‘i and because of the importance of agriculture as a historic land use in Māhāʻulepū, Mālama Māhāʻulepū supported the IAL designation of lands in and near the watershed of Māhāʻulepū. We also expressed concerns about the use of IAL lands for cultivation of GMO seed research crops and their attendant use of pesticides and herbicides.

Section 3.2 page 3-3 states about half (1,203) of the homes in Po‘ipu are "vacant". It is more correct to state that about half of the homes in Po‘ipu are used for transient vacation rentals.

EISPN section 3.3 Infrastructure - Agricultural Operations states that the current "Conservation Plan covers agricultural use of these lands, approved by the West Kaua‘i Soil and Water Conservation District in December 2013." [p. 3-4] The Conservation Plan was inaccurate about the soil types of Māhāʻulepū and contained unacceptable sparse information about the dairy site and its surroundings. There was no area map, no topographical information and no discussion of the area’s natural resources. The "plan" greatly alarmed the community. It would be better to simply state that there is going to be a revised Conservation Plan in the Draft EIS.

CONCLUSION:

In summary, I am anticipating an exceptionally thorough Draft EIS because of the importance of this special area and extensive and legitimate community concerns. My overriding concern is that deleterious impacts of the dairy could foreclose the range of future beneficial uses of the environment of Māhāʻulepū. This amazing place provides extensive benefits as is and could offer more to future generations.

Respectfully and with aloha,

Beryl Blaich
P.O. Box 1434
Kīlauea, HI 96754, 808-828-1438, 808-346-9589

Māhāʻulepū
Mahaulepu Farm and Grove Farm, allow for stability in support of farm ventures, help maintain regional water systems and provide agricultural employment for Kaua‘i residents in addition to fresh, local food.

The project site is on agricultural land in Māhāulepū Valley, an area with a long history of agricultural use as it was the first place in the island chain where sugarcane was commercially grown. The site is in the Agricultural District per State Land Use District designations, and per the County of Kaua‘i zoning ordinance. The site consists of land classified as Prime per the State Department of Agriculture's Agricultural Lands of Importance to the State of Hawai‘i (ALISH). The HDF site is outside of the County-designated Special Management Area under the Coastal Zone Management Program.

In 2005, the State established Important Agricultural Lands (IAL) by statute. The purpose of IAL is to conserve and protect agricultural lands, promote diversified agriculture, increase agricultural self-sufficiency and assure the availability of agriculturally suitable lands. The designation process determines land meet physical requirements including contiguous, functional land units large enough to allow flexibility in agricultural production near appropriate infrastructure and water, with high quality soil agricultural productivity ratings under the Land Study Bureau of University of Hawai‘i.

In 2011, Mahaulepu Farm LLC filed a petition with the State of Hawai‘i Land Use Commission to designate 1,533 acres of agricultural lands in Māhāulepū (including 557 acres that make up the HDF site) as IAL. IAL designation meets the objectives of the State HRS §205-42 by contributing to the maintenance of a strategic agricultural land resource base to support a diversity of agricultural activities and opportunities that expand agricultural income and job opportunities. See Figure 4.4-2 in DEIS Section 4.4.

The designation process determined that the land meets a number of physical requirements established in HRS §205-45, including contiguous, functional land units large enough to allow flexibility in agricultural production near appropriate infrastructure and water, with 88.5 percent of the area featuring an overall soil agricultural productivity rating of "B" per criteria established by the Land Study Bureau of University of Hawai‘i.

The development and long-term operation of HDF will be in full compliance with its agricultural State Land Use District designation, ALISH classifications, and County zoning. The dairy farm will embody the intent of the IAL designation per the Hawai‘i State Constitution, by using these protected lands for the intended purpose of diversified agriculture, food production and agricultural self-sufficiency. HDF development of a dairy also supports the "secondary intent" for lands in the Agriculture land designation, to provide an opportunity for Kaua‘i citizens to reside in an agricultural community. This is in contrast to the described "agricultural subdivisions" that have changed parts of Kaua‘i intended for a rural landscape, with development as quasi-suburban landscapes dotted with residences on large lots.

Overall, the project provides long-term benefit and support of agricultural lands and industry through continued use in keeping with zoning and IAL designation. Long-term operation of the dairy does not preclude the region for future protection in a coastal park at Māhāulepū.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix I.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $164,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk will be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.
The groundwater and surface water analysis conducted for this Draft EIS identified potential impacts from the proposed Hawai'i Dairy Farms (HDF) operations. The analysis examined whether the shallow groundwater in the alluvial material committed herd size and the impact of the dairy on the quality of groundwater and surface water. The analysis also considered the ability of the alluvium to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move through the soil.

MATERIAL QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources, and evaluated potential impacts from the proposed HDF operations. The technical reports are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22, and 4.23. The geology of the area is described in Appendices E, F, G, and H. The geology of the area is described in Appendices E, F, G, and H.

GROUND WATER:

The groundwater and surface water analysis conducted for this Draft EIS identified potential impacts from the proposed HDF operations. The analysis examined whether the shallow groundwater in the alluvial material committed herd size and the impact of the dairy on the quality of groundwater and surface water. The analysis also considered the ability of the alluvium to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move through the soil.

The alluvial material is highly weathered lava and is comprised of dark brown to black clayey silt. The alluvial material is highly weathered lava and is comprised of dark brown to black clayey silt. The alluvial material is highly weathered lava and is comprised of dark brown to black clayey silt. The alluvial material is highly weathered lava and is comprised of dark brown to black clayey silt.

The assessment concludes that the modest potable water demand from the dairy operation and the 4,500-ha distance between the Mahukulapua 14 well and the alluvial material in the Mahukulapua 14 well is not expected to have any significant impacts on the quality of groundwater in the Mahukulapua 14 well. The assessment concludes that the modest potable water demand from the dairy operation and the 4,500-ha distance between the Mahukulapua 14 well and the alluvial material in the Mahukulapua 14 well is not expected to have any significant impacts on the quality of groundwater in the Mahukulapua 14 well.

The groundwater monitoring wells were installed by the State of Hawaii Department of Health, Clean Water Branch, to determine whether the shallow groundwater in the alluvial material committed herd size and the impact of the dairy on the quality of groundwater and surface water. The State of Hawaii Department of Health, Clean Water Branch, conducted monitoring to determine whether the shallow groundwater in the alluvial material committed herd size and the impact of the dairy on the quality of groundwater and surface water. The State of Hawaii Department of Health, Clean Water Branch, conducted monitoring to determine whether the shallow groundwater in the alluvial material committed herd size and the impact of the dairy on the quality of groundwater and surface water. The State of Hawaii Department of Health, Clean Water Branch, conducted monitoring to determine whether the shallow groundwater in the alluvial material committed herd size and the impact of the dairy on the quality of groundwater and surface water.
encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōlā - Po‘ipū - Kāhāno districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery.

Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three
times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release; rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipoli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants. The Clean Air Act is administered by the Environmental Protection Agency (EPA). The Clean Air Act authorizes the EPA to establish National Ambient Air Quality Standards (NAAQS) that are as strict or, in some cases more strict than the State Ambient Air Quality Standards (SAAQS). State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Dust

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

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is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670 feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.
February 11, 2015

VIA REGISTERED MAIL
State of Hawai‘i
Department of Health
1250 Punchbowl Street
Honolulu, HI 96813

VIA REGISTERED MAIL
Group 70 International, Inc.
925 Bethel Street
5th Floor
Honolulu, HI 96813

VIA REGISTERED MAIL
Hawai‘i Dairy Farms, LLC
P.O. Box 1690
Koloa, HI 96756-1690

RE: RESPONSE TO PROPOSED ENVIRONMENTAL IMPACT STUDY

To all whom it may concern,

We reside at 1610 Makaui. Our home is located very close to the southern most point on Kauai at Poipu. We are approximately 1-1/2 miles from the proposed Dairy Farm as the crow flies. The proposed Dairy Farm will negatively impact our property value, and ability to enjoy the outdoors. Additionally, it will contaminate the air with stench from the cows waste and manure.

First, due to our close proximity to the Dairy Farm we will necessarily be impacted by the biting flies, which will originate from the proposed number of cows on the acreage. This is an issue, which is not addressed, in the proposed EIS. However, this will occur and it will eliminate our ability to sit outside during the day and evenings without being bitten.

The odor and stench from 2,000 cows which will generate 200,000 pounds of manure and 16,000 gallons of urine on clay soil each day will further decrease our enjoyment of our land. The impact of the odor is also not addressed by the proposed EIS but will occur, will impact our enjoyment of our land and will also negatively impact property values.

We both enjoy the use of our lanai and swimming pool; but odor and biting flies will curtail this use or our property and cause us to be driven inside.

Further, the foregoing will drive our property value down as the reason we purchased the property was to enjoy the outdoors, the pool, gardening and these pursuits will be cumbersome if we have to dress to avoid being bitten by biting flies or wear masks to avoid the stench from the cows waste. Potential purchasers of the property will look elsewhere as no one comes to Kauai to cover up to avoid being bitten by flies and smell foul odors.

These same factors will also directly and negatively impact the tourist industry on the South Side of Kauai. A prime example of this is the loss of conventions already experienced by the Grand Hyatt.

On a broader scale, the proximity of the Kolon drinking wells to the Dairy Farm and the strong probability of contamination to that drinking water if the Dairy Farm proceeds with its plans places the health of the entire community at risk. I recognize that the Dairy Farm does not want to acknowledge that in Kauai we do have days and nights of heavy rain fall because it does not fit within the parameters of their proposed plan, but all of us who live here know that this occurs. When it does, the drinking water of the residents will be contaminated.

Independent experts have already determined that the Maha‘ulepu soil is primarily non-absorbent clay and that the manure and urine from the cows will naturally flow into the watersheds and the ocean, but again the proposed EIS declines to consider these facts from independent scientists.

The Hawai‘i Dairy Farm’s Position that its presence will not negatively affect the community is not well considered. Employees of the Hyatt who have lost their jobs would “beg to differ.” Due to the cancellation of conventions at the Grand Hyatt, when word of the proposed Dairy Farm became news, employees lost their jobs. The Hawai‘i Dairy Farm is already adversely impacting our community.

Finally, there are many alternate locations where this project could occur which would not have the direct and negative impact that it will have with its proposed current placement at Maha‘ulepu. It is baffling that the Hawai‘i Dairy Farm continues to strong-arm a community when the scientific evidence of its negative impact on the community is so grossly overwhelming.

Your consideration of the foregoing is critical to a long established way of life on Kauai.

Sincerely,

[Signature]
[Signature]
Soil conservation is a core principle behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kauai Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a "Custom Soils Resource Report for Island of Kauai, Hawaii." The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalihi Clay at 32 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 demonstrated the pasture-based system as an economically and environmentally sustainable model for Hawaii. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**SOILS:** Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainfall for use during dry periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawaii at Manoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.
As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawaiian soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy's focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbon in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Mā'ili'ili area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site utilizing manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila musophila, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation kau-‘ōhi‘a forests.

By populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest's life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Mā'ili'ili Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pads in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kībā-Piʻiʻi region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ala Kōnī Road between Kībā and Piʻiʻi, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized control to reduce pest populations need to address breeding sites in and amongst the food and animal wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMP will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i’s Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, masons, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $60,000 to the County when the 699 cow herd is established. When the dairy has matured to full
production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential committed herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kēōkea area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kēōkea series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kēōkea–Pā‘ipā region is on the order of 201 – 500 feet per day.

Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kēōkea F well will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kēōkea F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.
Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kauai community.

Regional Water Demand: The adjacent, developed Ko‘o‘o-Po‘ipi‘i region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kauai will increase county-wide by 17,500 residents by 2030. The South Kauai population is estimated to reach 16,655 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kauai region (the Ko‘o‘o - Po‘ipi‘i - Kalahoe districts), water use in 2035 is projected to be 3,242 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built structure within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the groundwater in the deep aquifer were documented. Future monitoring will allow to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. HDF has conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and increasing demand for potable water for community and resort development.

The State Department of Economic Development and Tourism (DBEDT) projects the population of Kauai will increase county-wide by 17,500 residents by 2030. The South Kauai population is estimated to reach 16,655 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kauai region (the Ko‘o‘o - Po‘ipi‘i - Kalahoe districts), water use in 2035 is projected to be 3,242 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.
the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Pu‘ipī region were also calculated. Nitrogen input to the marine environment in the Pu‘ipī region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pu‘ipī region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Wainiha Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR dairy neighbors and the local Ka‘u community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing
system will be on pasture 22 hours each day and will spend two hours—in two separate milking cycles—moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM$_{10}$ and PM$_{2.5}$) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM$_{10}$ is 2.01 μg/m$^3$, well below the State standard of 150 μg/m$^3$. The estimated concentration for PM$_{2.5}$ is 0.23 μg/m$^3$, well below the Federal standard of 35 μg/m$^3$ (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity /mixing). Generally, tradewinds will disperse odors to less than detected levels beyond the HDF site; in periods of off-trade wind, or when the tradewind flow is disrupted creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of separate milking cycles—moving to and from the barn for the 10- to 15-minute milking sessions.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).
The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).

- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.

- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 4) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand reducing dependence on imported milk (Objective 1).

- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 4).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the O‘HE website at the following URL search "Hawai‘i Dairy Farms": http://tinyurl.com/OHECKAUA

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, ACP, LEED AP
Principal Planner
Further, the foregoing will deprecate our property value and along with it the tax base. Potential purchasers of the property and tourist will look elsewhere as no one comes to Kauai to avoid being bitten by flies and sweet fowl odors.

These same factors will also directly and negatively impact the tourist industry on the South Side of Kauai. A prime example of this is the loss of conventions already experienced by the Grand Hyatt.

On a broader scale, the proximity of the Koloa drinking wells to the Dairy Farm and the strong probability of contamination to that drinking water if the Dairy Farm proceeds with its plans places the health of the entire community at risk. I recognize that the Dairy Farm does not want to acknowledge that in Kauai we do have days and nights of heavy rain fall because it does not fit within the parameters of their proposed plan, but all of us who live here know that this occurs. When it does, the drinking water of the residents will be contaminated.

Independent experts have already determined that the Maha‘ulepū soil is primarily non-absorbent clay and that the manure and urine from the cows will naturally flow into the watersheds and the ocean, but again the proposed EIS declines to consider these facts from independent scientists.

The Hawai‘i Dairy Farm’s position that its presence will not negatively affect the community is not well considered. Employees of the Hyatt who have lost their jobs would “beg to differ.” Due to the cancellation of conventions at the Grand Hyatt, when word of the proposed Dairy Farm became news, employees lost their jobs. The Hawai‘i Dairy Farm is already adversely impacting our community.

Finally, there are many alternate locations where this project could occur which would not have the direct and negative impact that it will have with its proposed current placement at Maha‘ulepū. It is baffling that the Hawai‘i Dairy Farm continues to strong-arm a community when the scientific evidence of its negative impact on the community is so grossly overwhelming.

Your consideration of the foregoing is critical to a long established way of life on Kauai.

Sincerely,

[Signature]

Phillip L. Blessing

Kathleen L. Blessing
Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2, these practices codes identify design and construction standards related to drainage, materials operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soils Resource Report for Island of Kaua‘i, Hawai‘i.” The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalihi Clay at 32 percent, Kula Clay at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 determined levels of pH, phosphorus, nitrogen, potassium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus calcium, magnesium, and potassium.

Poorly drained soils lack a significant level of organic matter, that reduces the potential for impacts on waterbodies. In this way, "poorly drained" soils may represent less risk of nutrient leaching to associated waterbodies than "well drained" soils (Yost, 2016).
An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhā'ulepu Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pads in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kō‘a-Pi‘ipii region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ala Kinoiki Road between Kō‘a and Pi‘ipii, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animal wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

**DEMOGRAPHIC AND ECONOMIC**

The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plach Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix I.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairy remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $63,000 to the County when the 699 cow herd is established. When the dairy has matured to full
production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 44 million gallons (367,197,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kāhoa area was built by Napali formation lavas of the Waimae volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kāhoa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kāhoa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvium might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kāhoa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kāhoa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.
Surface Water Quality: The Ku‘ai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the groundwater in the deep aquifer were documented. Future monitoring will allow to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CBW had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CBW to conduct a “Sanitary Survey” of the Māhāulepū and adjacent watersheds. HB conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator bacteria levels. CBW noted that Waiopili Ditch is a man-made drainage on private properties and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations: Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of a drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Efficient Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic needs of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain...
the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā`ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Pu`ipi`i region were also calculated. Nitrogen input to the marine environment in the Pu`ipi`i region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pu`ipi`i region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Wainiha Ditch provides the major fresh water input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean monitored for some time in the years following establishment of the dairy.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean water. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Ka`u community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai`i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day. Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastural rotational-grazing
system will be on pasture 22 hours each day and will spend two hours in two separate milking cycles—moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM$_{10}$ and PM$_{2.5}$) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM$_{10}$ is 2.01 μg/m$^3$, well below the State standard of 150 μg/m$^3$. The estimated concentration for PM$_{2.5}$ is 0.23 μg/m$^3$, well below the Federal standard of 35 μg/m$^3$ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://www.eisain.com/040CIA040

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Sharon Boll  
P.O. Box 1576  
Kapaa, HI 96746

Subject: Hawai‘i Dairy Farms  
Environmental Impact Statement Preparation Notice  
Māhā‘ulepū Road  
Kaua‘i, Hawai‘i

TMC: (4) 2-9-003: 001 portion and 006 portion  
(4) 2-9-001:001 portion

Dear Sharon Boll:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:**

Be clear that most people on Kaua‘i do not want a dairy in our beautiful Kaua‘i, Hawai‘i, Māhā‘ulepū area. It is a delicate beautiful area, undeveloped and culturally significant. We know without an environmental impact statement that now "zero discharge" will eventually corrupt the ecosystem. There is NO SUCH THING AS A "ZERO DISCHARGE" COW. I am concerned that once the dairy is underway the land will be further developed because that is what the real money is. Additionally, our understanding is that the dairy product is not even marketed for Kaua‘i. The few of the cloud is Māhā‘ulepū, Hawai‘i, and a dairy like this does not belong that close to the places, people and cultural sites. Please find a more responsible place.

Return to:  
Group 70 International, Inc.  
925 Bethel Street, 5th Floor  
Attn: HDF Project  
Honolulu, HI 96813  
hawaii@group70int.com

Deadline: February 23, 2015
Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP/N. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cow’s diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently-sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrient source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddle fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows last milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā‘ulepū site applies to mature dairy caws.
Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai'i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven't given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

**VISUAL RESOURCES:** The Draft Environmental Impact Statement (EIS) addresses the existing visual and aesthetic resources of the dairy site, and the potential impacts of Hawai‘i’s Dairy Farms. Draft EIS Section 4.5 addresses potential effects to public scenic views.

The County of Kaua‘i General Plan identifies the HDF site as agricultural land in a region consisting of open space, parks, and conservation lands in the mountains and along the coast. The important visual landforms identified in the surrounding region are Po‘u Humuhuni Crater to the southwest, the scenic roadway corridor of Ala Kinoiki Road, and the Hā‘upu Mountains that surround the project area to the northeast. However, the majority of the project area has gentle topography, with no prominent physical features standing out within the broad agricultural valley.

The dairy site is not visible from public vantage points along public roads and areas along the coastline. Vegetation and topography screen public views of the Māhā‘ulepū Valley lowlands. Dairy farm structures will conform to County height limits for agricultural zoned land. The tallest structures of the Hawai‘i Dairy Farms facility will include the milking parlor and the associated storage tanks, all of which are roughly 33 feet in height. These items are in keeping with the agricultural character of the area, and would be expected to have minimal to no impact on public views of the Po‘u Humuhuni crater; views from the Ala Kinoiki Road corridor; or the views of the Hā‘upu Mountains surrounding the project.

**ARCHAEOLOGICAL AND CULTURAL:** The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-10-3094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic-era cultural materials associated with the many Land Commission Awards in the project area were nonexistent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bone fragments were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs. Its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhā‘ulepū Ahupua‘a has been and is currently used for traditional cultural purposes. However, the dairy project is not expected to be included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-10-3094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully endorsed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

**ALTERNATIVES:** As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each
reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and permitting uses, each fails to comprehensively fulfill the project requirements as defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agriculture/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agriculture/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: http://tinyurl.com/OEQCкуAУI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kīlauea series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kīlauea-Poʻipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 2,600 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kīlauea F well, will result in no adverse impacts to ongoing use of groundwaters and surface waters in the area.
groundwater in the volcanic aquifer layer, which is the source of potable water. Facilities within this area will not impact the alluvial aquifer layer, which will be protected by a property line setback and an earthen embankment.

Though the water body in which the County well occurs is confined and exposed of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery.

Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery.

Groundwater in the alluvium will not impact the County drinking water well. Though the water body in which the County well occurs is confined and exposed of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and aquifer layer were documented by the monitoring program, which will be shared with the Department of Health, Clean Water Branch, and the Kauai County Water Branch. The monitoring program will allow for the detection of uncharacteristic or trends in the water quality data, which could be indicative of potential impacts from the dairy facility and associated infrastructure.

Surface Water Quality: The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the Hawaii State Department of Health (DOH) and provided data, however; DOH was unable to utilize the data as it did not meet Quality Assurance/Quality Control (QA/QC) guidelines. The group had conducted water quality sampling for other members of the public. Complaints from the public citing the high level of enterococcus in Waiopili Ditch and area upstream, and initiated a series of investigations. The results of the DOH’s microbial investigations showed that wastewater from the dairy was the source of the high levels of enterococcus.

HDF Operations, Setbacks and Buffers: Normal ongoing farming and machine activities are exempt from the Clean Water Act. Section 104 of the Clean Water Act requires permits for discharge of pollutants to navigable waters. HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of the fence to the edge of the property, and is not an inviting recreational body of water utilized by people. The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. A Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery.

Regional Water Demand: The Kauai-Paipai region shows large increases in demand for potable water for community and resort development. The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. A Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery.

SURFACE WATER

Theᴴᴰ-Facility is located on the easternmost section of the Malaekahana Valley, which is fed by several intermittent streams coming off the south slope of the Ha'upu Ridge. The Malaekahana Valley is drained by the upper Malaekahana Stream, which originates at a small unnamed reservoir to the west that originates at a small unnamed reservoir and continues to flow toward the ocean. Vegetative buffers will be established between the force and drainageways to
create filter strips that could capture particulates during stormwater runoff events.

Another setback restricts application of effluent within 50 feet of the drainages; water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be conducted to assess the impact of surface water runoff from the dairy facility. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacterial constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacterial constituents are not being released at levels of environmental concern.

SOILS: Soil is a complex system that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during dryer periods, to filter and reduce the potential for nutrients and bacteria to enter surface and marine waters. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing surface and marine water impact report is included in the Draft EIS as Appendix F.

Nutrients from Efficient Irrigation and Commercial Fertilizer Application: The additional 7.5 acres of pasture are to be used for the future contemplated development of a large commercial fertilizer that would be needed to sustain agricultural activities, and to provide habitat for soil microorganisms to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HIF to understand and characterize available soil nutrients and condition. Section 4.3 of the Environmental Impact Statement (EIS) demonstrates that soil conditions, including the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs are estimated to be 30,500 pounds (totaling 950 pounds per year) of nitrogen and 900 pounds per year, one percent of phosphorus (totaling 900 pounds per year). Additional grass yields are anticipated to be 140 pounds of nitrogen and 100 pounds of phosphorus per year. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 1,800 pounds per year) and one percent of phosphorus (totaling 900 pounds per year). The nutrient input would occur at rates of 8.5 tons of nitrogen per day, or an average of 10 days per year. Per best practices, no effluent application would be conducted during such weather events.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified the soil for more than 95 percent of the United States. Comments received during the initial scoping for this
gazed pasture can drive substantial accumulation of organic carbon in soil. With a
define an area of interest, customize data results, and generate a Custom Soil
are likely greatest in highly degraded soils in warm subtropical climates, partly due
provide an evaluation of air quality conditions and project impacts, including a windrose depicting wind
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The NRCS soils classifications and descriptions provide a good information base,
 conditions. The most abundant soil types at the HDF site are Kalan clay at 32
percent, Kula clay Brown Variant at 29 percent, and Lahaina Clay at 14
A second round of field sampling was conducted in 2015, and focused on evaluation of
samples for each site were analyzed for nutrient levels. Laboratory analysis determined levels of
conductivity and exchangeable sodium percentage, in addition to nutrient levels of
Due to poor drainage, or a slow rate of ground water movement through the
As a result of reduced movement of water through the soil profile, the mobility of
nitrogen, and potassium. Poorly drained soils may represent less risk of nutrient and nitrite
phosphorus can be applied at rates greater than crop requirements if
matters such as potassium and phosphorus are also reduced. Soil types at the HDF
surplus, which reduces the potential risk for products on stormwater leading to associated waterbodies than well drained soils (Yost, 2014). In this way, poorly drained, poorly
Drift will be generated as cows move along soft limestone walkways that connect
Emissions relevant to livestock operations include particulate matter and fugitive
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Clean Air Act of 1970 (CAA), amended November 1990, the U.S.
Environmental Protection Agency (EPA) regulates both large and small sources of
air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for
six criteria pollutants. The State of Hawai'i has established its own State Ambient Air
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emission rates were estimated from published literature, where particulate matter
application. No soil of Nation regulations for greenhouse gas emissions from farm

Potential odors and emission levels for air pollutants relevant to dairy operations
were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25
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air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM$_{2.5}$ is 0.23 μg/m$^3$, well below the Federal standard of 35 μg/m$^3$ (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odor emissions for dairy facilities and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odor would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual odor emissions are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

**DAIRY OPERATIONS**

Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhūʻelepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”, the term is not used in this EIS.

HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture or a forage-based diet. Due to the evolving definition of “grass-fed”, the term intended to be used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhūʻelepū site on Kaua‘i have been conducted for more than 18 months. The
results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobes”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The paddocks can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for Hawaii is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā‘ulepū site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and utilize the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd. Heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. FDA-approved hormones may also be used as prescribed by a licensed veterinarian. HDF will not treat cows with bovine growth hormone, referred to as rBST or rBGH.

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā‘ulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation.
practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila maculipilha, the only Kaua'i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation ka'ōh`ō forest.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially IPM disrupts reproduction with appropriate means at key points in the pest's life cycle. Used in Hawai'i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua'i and those species already in Māhāulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pats in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōkō-Po'ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ali Kinoiki Road between Kōkō and Po'ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animals wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

**NOISE:** Existing noise conditions of the project site and the surrounding Māhāulepū valley area are evaluated in the Draft Environmental Impact Statement (EIS), along with anticipated short-term and long-term noise conditions associated with the dairy farm and planned mitigation actions. Draft EIS Section 4.12 addresses noise conditions.

Noise can be defined as unwanted sound, a sound that is considered loud or unpleasant, and/or sound that causes disturbance. Research related to noise and livestock focuses on noise levels and minimization of unexpected sounds that cause undue stress on cows. Noise stress results in loss of livestock productivity and thereby financial loss to farmers and ranchers. Little research exists on the sound levels from livestock.

Sound is measured in decibels (dB). The State of Hawai'i Department of Health (DOH) rules use the A-weighting sound network (dBA) in the HAR §11-46, Community Noise Control. Sound through the air is similar to ripples on a pond of water. In open space without reflection, ripples spread uniformly in all directions and decrease in amplitude further from the source. In free field conditions such as outdoors, amplitude drops by half as distance doubles (OSHA, 2016). When sound passes close to absorbing ground cover such as grassland and fields, the "soft ground" absorbs extra sound as it passes. The Hawai'i Dairy Farms (HDF) site in Māhāulepū Valley is approximately 2 miles from the resort area, and 1.5 miles from the closest residential areas (on land zoned for agriculture). Typical noise currently generated near the HDF site includes truck ingress/egress along private farm roads, agricultural equipment, and cattle and sheep.

Construction work at the project site will involve activities that may generate an increase in noise levels. However, such exposures will be a short-term condition, occurring during daylight hours. Construction vehicles and activities must comply with DOH Administrative Rules. DOH noise control regulation requires a permit for construction activities that emit noise in excess of 78 decibels or that cost a total of more than $250,000. Mitigation measures to minimize construction noise will include the use of mufflers to suppress loud equipment and limitations on the hours of heavy equipment operation.

The dairy farm will utilize milking equipment contained in the milking parlor, and will use field equipment such as tractors. Under HAR §11-46, agriculture is classified as Zoning District C-3, which specifies maximum permissible sound levels of 70 dBA in the daytime and 70 dBA at nighttime. Dairy operations will generate noise in keeping with agricultural zoning of the parcel. The primary noise receptors in the area would be farmers working nearby parcels. Noise from the dairy will not exceed the DOH threshold, and will not contribute to excessive noise in the region.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai'i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, foremen, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua'i and 8 on Kā`u. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua'i.

The HDF project would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State...
extend ed survey area. Only one of the sites is believed to be associated with pre-

supplied. The HDF project, with an established herd of up to 699 mature dairy cows,

and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of

the project area. The remaining sites consist of historic-era bridges, ditches, culverts,

and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not

would be created on O'ahu.

Additional employment generated by a possible expansion to accommodate the

contemplated 2,000 mature dairy cow herd is estimated at approximately 3

construction jobs plus 4 indirect jobs on Kaua'i, and 2 indirect jobs on O'ahu for a

total increase of 9 jobs. For on-going operations at the contemplated herd size, an

additional 5 full-time farm jobs would be added, with approximately 15 additional

indirect jobs on Kaua'i and another 8 indirect jobs on O'ahu.

The dairy is expected to generate a net additional contribution to the County of

approximately $8,000 for improvements related to expansion for the contemplated

herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the

committed herd size). The State will derive approximately $360,000 annually in

revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated

nuisances that could affect property values as a result of dairy implementation or

operations. No noticeable odors, flies, noise, waste or water discharges will impact

resort or residential areas. As such, the dairy will not adversely affect residents,

nearby recreational activities, guests in nearby resorts, or diminish property sales or

property values in the area.

ARCHAEOLOGICAL AND CULTURAL: The Hawaii Dairy Farms (HDF) project is

subject to a historic preservation review by the State Department of Land and

Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter

6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural

Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for

the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology

and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of

the project area and an extended survey area of 100 meters of the northern

boundary. Six historic-era sites occur in the project area and 10 sites occur in the

extended survey area. Only one of the sites is believed to be associated with pre-

Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau,

and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of

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Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau,
scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) could create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
February 22, 2015

Ms. Laura McIntyre
Environmental Planning Officer
State of Hawaii, Department of Health
919 Ala Moana Boulevard, Room 312
Honolulu, HI 96814

cc: Hawaii Dairy Farms
c/o Jeff Overton, Principal Planner
Group 70 International, Inc.
925 Bethel Street, Fifth Floor
Honolulu, HI 96813

Dear Colleagues:

I am writing to comment on Hawaii Dairy Farms (HDF) Environmental Impact Statement Preparation Notice (EISPN) which was published in The Environmental Notice on January 23, 2015. By way of this letter, I am requesting to be a consulted party in the applicant’s EIS process, and I request that Hawaii Dairy Farms address the following areas in the scope of its EIS.

Figure 1.1 Project Location Map
Please show perimeter of the proposed farm and perimeters/points of the following neighborhoods/locations: Mahaulepu Beach, Gillen Cottage, Kawaiola Bay, Grand Hyatt Hotel, Poipu Bay Golf Course, Poipu Kai Resort, The Point at Poipu, Makahuena, Poipu Aina, WeliWeli Tract, Kahuna Golf Village, Koloa Town, Poipu Beach Park, Poipu Gateway Village (proposed). Please compute the distance from the proposed farm perimeter to perimeters and centers of neighborhoods/locations listed above. In another map, please show the outline of the proposed farm and listed neighborhoods and “impact rings” at 1 mile, 2 miles, 3 miles and 5 miles from the proposed farm center and from the proposed farm perimeter.

2.1 Purpose and Need for Action
“Clean, cost-effective, and sustainable method”
The applicant should provide evidence and supporting documentation for concluding that the proposed action is “clean, cost effective and sustainable.” What criteria are being used to make these statements and how does the proposed action measure up against selected criteria?

“Suitable soils”
According to the National Resource Conversation Service Custom Soil Resource Report for Island of Kauai dated June 2014, the soils on the proposed site are very limited in their ability to support an animal waste operation. “Poor performance and high maintenance should be expected.” The applicant must address the soil properties of the site and discuss the limitations of the soils with respect to absorption, saturation rate, ponding and standing water of each soil type encountered on the farm, and address the probability of storm water runoff. Further, the applicant should address why, given the poor characteristics of the soils, this location was selected. How does the applicant intend to prevent storm runoff from reaching streams and the ocean?

2.3 Proposed Action
“Grass-fed”
What are the USDA requirements for a dairy to be considered “grass fed”? Please demonstrate how HDF meets these standards.

“Locally available nutritious milk”
What local entity will process the milk? Where is the facility located, and what agreements are in place to ensure that Kauai milk is returned to Kauai? How long is the duration of proposed processing agreements? How much milk (Hawaii produced and imported) is currently available today, and how much is really needed over the next 5 years?

“Zero-point source discharge, meaning 100% of the cow’s manure will remain on the farm as fertilizer for the pasture grass”
Please discuss how much manure and urine is deposited by each cow each day, and how much is deposited by 699 cows and by 2000 cows at full scale production. Please provide the total amount of manure and urine left in each active grazing paddock. How many paddocks are in use each day for 699 cows and for 2000 cows?

Please describe how and when the grazing paddocks will be fertilized. Describe how frequently liquid effluent, solid sludge, and direct manure will be applied to the grazing paddocks, and in what proportions. Please explain what chemical fertilizers, in addition to manure and effluent, will be applied to grasses and in what form: sprayed, granular, other??
Please provide a detailed description of the equipment that will be used to apply effluent, and how equipment operates in a variety of wind conditions. How far will effluent spray travel over a variety of typical scenarios for the region: 15-20 mph trade winds, 2-5 mph lono winds, among others. How will effluent spray be contained?

The County of Kauai General Plan states that non-point discharges have greater impact on streams and waters than point source discharges. Please describe how the farm’s activities are not contrary to the Hawaii Coastal Non-Point Pollution Control Management Plan (1996).

“Field trials of kikuyu varieties... by horticultural experts”

Please provide results of grass trials. What are criteria for success? Who are the horticultural experts? Please provide their backgrounds and levels of expertise to perform the analysis of the grass.

“Waste Management Plan reviewed by DOH”

What are the EPA’s specific requirements used by DOH to review the waste management plan? The draft EIS must address full scale production at 2000 cow level, not just 699 cows.

“Establish herd... over several years”

What specific criteria will be used to increase herd size? Where is specific location of local ranching partners’ acreage? How many offsite locations will be utilized? How many heifers, non-milking cows, calves, and bulls will be moved off site, and what is expected distribution of animals by type? At full production of 2000 cows, on average how many offsite animals will there be? How will their nutritional and water needs be met? Please describe average density of off-site animal plan relative to acreage available from local ranching partners.

2.4 Alternatives

No Action Alternative

The Kauai County General Plan, which is intended to improve the physical environment of the County and the health, safety, and general welfare of Kauai’s people, states that one key goal is to preserve Kauai’s rural character by promoting and preserving “open agricultural lands as a key element of Kauai’s character, essential to its image as “The Garden Island” and to the continued viability and development of Kauai’s visitor industry.” In addition, the General Plan seeks “to develop revenue producing uses that are sensitive to the area’s unique qualities.”

The proposed industrial dairy is in direct conflict with the Kauai County General Plan because it creates significant adverse impacts to the adjacent established resort neighborhood and which risk the viability and continued growth of Kauai’s major visitor industry already in place on the South Shore. The applicant should address how the size and scope of a 2000 head dairy will add to the continued viability and development of Kauai’s visitor industry.

Our landscapes attract visitors from around the world and have economic value. The South Shore of Kauai has many unique geographic qualities, including word famous Poipu Beach, the lithified cliffs along the Mahaulepu Trail, the Makawahi Caves, just to name a few. The applicant should address how these unique features will be protected from harm.

Alternative Dairy Location

The applicant states that required location criteria include suitable soils, 500-600 acres of usable gently sloped land, reasonably priced water, roadway access, potable water, and irrigation water.

The plan should detail what other sites across Hawaii were evaluated and ultimately eliminated, and discuss specific criteria that led to their elimination from consideration, specifically:

- What other Grove Farm parcels were considered and rejected?
- What other landowner parcels in Kauai (Gay and Robinson, Hawaiian Home lands, etc.) were considered and rejected?
- What other Important Agricultural Lands were considered and rejected?
- What discussions were completed with State of Hawaii DLNR or DOA regarding State Agricultural Park Programs and availability of other state lands?
- What other parcels on other islands were considered and rejected?

Ulupono Initiative has announced that it is evaluating the purchase of Cloverleaf Farms, a 900 acre, 700 head dairy already operating on the island of Hawaii. The applicant should explain how the existing facilities, operational inputs, and soil conditions of the Cloverleaf parcel fit the stated ideal location criteria. In addition, the applicant should review the Cloverleaf location with respect to the 13 significant impact criteria so that the public can compare the stated benefits and adverse impacts of the two locations. Specifically, the study should describe the Cloverleaf location relative to its nearby population center, the economic base of the adjacent neighborhood, the role of the visitor industry, adjacency to surface water streams and the ocean, location of watersheds and public drinking water supplies. Explain why the Cloverleaf location, which already has needed operational inputs, cannot be enhanced to achieve the stated goals of Hawaii Dairy Farms.

Confining Dairy Operation. What specific criteria would be used to assess the possible location of a confined dairy operation, and why would Mahaulepu Valley be considered a suitable location for such an operation? Why would Hawaii Dairy Farms consider this model of industrial farming? What are the risks and rewards benefits of this model?

“New Zealand Model”. Moreover, the proposed intensive rotational model has come under great criticism in New Zealand for its negative impact on the environment, including contamination of rivers and streams. If Hawaii Dairy Farms is using such a model, what is being proposed that is different to result in a different outcome? Why should we believe that the experience of Hawaii Dairy Farms will be any different from New Zealand farms that have caused great harm to the environment?
3.0 Environmental Setting

Unfavorable soil type means high probability of contaminated runoff. The predominant soil type is clay based and poorly draining. Based on the NRCS Custom Soil Resource Report referenced previously, the soils on the farm are very limited in their ability to dispose of wastewater by irrigation. There is a clear conflict between the applicant’s claim that the location provides “suitable soils” [Ref. Hawaii Dairy Farms EISPN, section 2.1] and the NRCS report that the soils are very limiting for an intensive animal feeding operation and land application of animal waste. “Poor performance and high maintenance can be expected.” [Ref. NRCS Custom Soil Resource Report for Island of Kauai, Hawaii, June 5, 2014]

The plan needs to address the severe limitations of the soils on the farm, why this location has been selected, despite the poor soil properties, and the high probability of contaminated runoff.

Upland from adjacent coastal zone. The location is upland from the nearby coastal zone and flanked by two ridges on either side. This poor location means that all excess water from rain events will eventually make its way down to the coastal zone by way of ditches, streams and rivers. Moreover, any serious rain event will send excess rain water down the ridges and on to the valley floor. The plan needs to address how surface water and ground water will flow across the site, and discuss the probability of excess manure laden water leaching into groundwater and spilling into Class 1 surface waters, including the Pacific Ocean.

Location prone to intense rain events. Rain events in Mahaulepu can be intense. Anyone who lives or works in the area knows this. “Kona” or southern winter weather storms are particularly laden with moisture which hits up against Haupu and drops heavy levels of rain suddenly in short periods of time. The plan needs to address the limitations of the site during peak rain events, not averages. The plan should model what would have happened in 2006 during Kauai’s famous “40 days of rain event”. Moreover, climate change scientists predict an increase in intensity and frequency of hurricanes and severe storms. The applicant has the responsibility to address the cumulative effect of climate change on the farm location and the management of water and effluent runoff.

Proximity to public drinking water wells and recharge zones. Kauai depends on ground water for potable water. The proposed location sits on the watershed that makes up the groundwater aquifer which feeds the public drinking water supply for Koloa and Poipu. The plan needs to include a detailed groundwater study, including rate and direction of flow and assessment of the impact of nitrate, bacteria, and manure leaching into the soil and through to the groundwater. Please provide a map which shows the perimeter of the farm, the public drinking wells for Koloa/Poipu, the recharge zones for the wells, and the effluent spray areas. Please provide exact distances from the Koloa/Poipu drinking wells and the perimeter of the farm.

Surface Water Resources and Impacts. The applicant should address the age, quality and condition of the various irrigation pipes and systems which cross the proposed farm. The Wahipili Stream is already impaired, per the monthly water testing from the Blue Water Task Force, Surfrider Foundation. What steps are going to be taken to address the current impairment and return the surface water to acceptable levels of contaminants before reaching Class 1 waters?

Ground Water Impacts. Please prepare a topographic map which shows the proposed farm, the underlying watershed and aquifer of the proposed farm. Please show the location of the public drinking water wells, relative to the perimeter of the farm, and denote distance from the farm to the public water wells. Please complete a detailed hydrology study of the water shed and the recharge zones for the public water supply. Please address how ground water quality will be monitored.

Prevailing trade winds bring odor, vector, and contaminated irrigation mist into population centers. The proposed location is in direct line with the prevailing north-east trade winds, the strongest and most persistent on the entire island. Winds generally blow in from the north east, and as the winds hit the cliffs at Kipu, they compress and pick up velocity and run parallel to the coast, in direct line to the major population and visitor destination centers of Poipu and Koloa, including the Grand Hyatt Hotel and Poipu Beach Park, County of Kauai. These winds will carry farm odor, flies, methane, and particulates from paddock irrigation. “There is no wind break or barrier sufficient to mitigate these prevailing winds.” [Ref. Chuck Bley, PhD.] The plan needs to address the high probability of wind borne pollution into existing population centers, visitor destination areas, and county parks. The plan should also address the impact of 2000 cows on greenhouse gases.

4.0 Probable Impacts and Mitigative Measures

4.1 Short Term Impacts

How many construction jobs will be created and for what period of time? What is the expected value of these jobs? What measure will be taken to mitigate noise, dust, and other impacts from construction?

4.3. Significance Criteria

The proposed action triggers multiple significance criteria. The applicant must address the possible impacts described below.

Significance Criteria: Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.

Mahaulepu and adjacent lands are sacred to the Hawaiian people, and there are many burial sites across the area. The applicant must complete a detailed archeological review of the area including the location of known petroglyphs, heiau, and burial sites. The farm cannot be viewed as a self-contained island that will not have impact on neighboring areas. In scoping the impacts, the geographical unit should begin with the ahupua’a, and extend beyond the geographic boundaries of the farm so as to ensure that the impacts that occur beyond the boundaries of the farm are assessed.

“The Mahaulepu Coast offers varied and readily accessible recreation activities in a wilderness type atmosphere.” [NPS p. 43] Moreover, “This little corner of Kauai [Mahaulepu] contains the most extensive, best-documented continuum of history of any single locality...of the Hawaiian archipelago. Geologically, in addition to Waimea Canyon and Na Pali, Mahaulepu is one of its gems.” [Chuck Bley, PhD. Kauai’s Geologic History, A Simplified Overview]
Significance Criteria: Curtails the range of beneficial uses of the environment

The soil cannot be changed, the winds cannot be redirected, the watershed cannot be diverted, and the rain won’t fall in a different place. These major negative features of the farm’s proposed location will have significant adverse impacts on the beneficial uses of the adjacent areas, specifically:

- **Beneficial use of Mahaulepu Beach and Waiopili Stream.** According to the South Kauai Community Plan, “Mahaulepu Beach functions as a de facto beach park and recreational area.” The mouth of the Waiopili Stream is a popular place for children to play in its shallow waters before releasing to the ocean. It is a common sight to see children wading and laying in the shallow waters at the mouth of the stream and adjacent tidepools. Families will no longer be able to enjoy this part of the beach due to high contamination caused by surface water runoff that courses over the grazing paddock laden with manure, enters the ditches, and ends up in the Waiopili stream and ocean. The plan needs to address the probability of contaminated runoff at the mouth of Waiopili and the beach at Gillen Cottage. The mouth of the stream is already polluted, and actions must be taken now to inform the public of the current impaired status of the stream. The applicant and landowner must identify an action plan and completion schedule to restore the site to healthful standards.

- **Impacts to Recreational Activities.** “The Mahaulepu Coast offers varied and readily accessible recreation activities in a wilderness type atmosphere.” [National Park Service Reconnaissance Study p. 49] Specifically, Mahaulepu Beach and adjacent waters are a popular spot for many water sports, including swimming, windsurfing, kitersurfing, and paddling. The reef areas in front of Waiopili Stream and Gillen Cottage are considered some of the best waters for kitersurfing and wind surfing. Participants in these water sports have the potential to be exposed to contaminated waters which come from the farm and would risk contracting illnesses borne in the surface water.

- **Impacts to small businesses dedicated to the visitor industry.** Many small businesses operate visitor tour companies in the adjacent areas, including hiking and walking tour companies, horseback trail rides, ATV and adventure outfitters. The high probability of odor, flies, and contaminated water will damage the quality of the product offered by these companies, especially along the Mahaulepu Coast Trail. The applicant needs to address how small businesses who utilize the area will not be significantly impacted by the dairy farm. The applicant needs to address the reputational risk for these companies through such outlets as customer reviews, on Trip Advisor, Yelp, and other on-line outlets.

- **Impacts hunting and gathering rights.** Fences surrounding the grazing paddocks will limit access to hunting and gathering areas in the valley and may disrupt wildlife corridors. The applicant needs to address the impact substantial fencing will have on wildlife movement and hunting practices.

- **Impacts to access rights -Public Access Shoreline Hawaii (PASH).** The applicant needs to address the potential adverse impact the dairy operation may have on Native Hawaiian access rights and the ability to travel freely between tracts of land, especially for gathering plants, wood, and other natural resources.

- **Impacts ancient Hawaiian trails.** Pursuant to HRS Chapter 198D (Na Ala Hele Program), the applicant must identify the existence of ancient Hawaiian trails through the property, especially through the fenced grazing areas.

- **Impacts fishing and gathering.** The nearshore waters of Mahaulepu are known as “prime fishing areas” and include ulua, papio, and oio. (NPS Park Study p. 26). It is highly probable that dairy operations will introduce excess nutrients to the waters, clearly compromising local fishing, spearfishing, and gathering opportunities.

- **Impacts critical habitat for endangered arthropods** (cave wolf spider and cave amphipod) may also be compromised as these arthropods rely on nutrient-rich seepage from water in the cave. According to the National Park Service, “The Waiopili Stream joins with natural springs and is linked hydrologically to the cave.” The applicant must address how the water will remain clean all the way to the cave, especially when the cave floods.

- **Impacts beneficial use by marine life.** The health of large marine animals may be compromised should the dairy be allowed to operate in its proposed location. The dairy will utilize drainage ditches which link to the Waiopili Stream which discharges into the Pacific Ocean at Mahaulepu Beach. Mahaulepu Beach is a successful monk seal pupping area, and monk seals are frequently sighted resting at Kawailoa. The water in the Waiopili Stream is already highly polluted (reference to other sections) and poses a health risk to these endangered animals. Green sea turtles (honu) also feed in the shallow waters on algae and sea grasses and bask on open beaches. The applicant must address how their operations pose no risk to marine life.

Significance Criteria: Substantially affects the economic or social welfare of the community or State

**Incentives to HDF.** Hawaii Dairy Farms has announced that it will invest $17.5 million in startup costs without government subsidies, and spend $6-$9 million a year to operate the dairy in Mahaulepu Valley. Please describe the components of the $17.5 million investment. Please describe how many short term jobs (due to construction) and long term jobs (from on-going operations) will be created. How many tax dollars are expected to go to the County of Kauai, the State of Hawaii, and the Federal government as a result of this investment, both short term and long term? Please evaluate the economic value of the proposed dairy farm to local ranching partners for receiving heifers, bulls, and calves from HDF.

Since the proposed location is designated “Important Agricultural Land,” please describe the tax credits, tax abatements, and other incentives that HDF will receive, and the total value of these incentives. For what period of time will these incentives be awarded, and what incentives, if any, have already been received? Given these financial incentives, what is the true out of pocket investment that HDF will incur both at start up and as an on-going enterprise.

**Substantial Impact on visitor industry.** The proposed industrial farm is located too close to the vibrant resort community of Poipu/Koloa. This area is the largest visitor destination on the whole island (South Kauai Community Plan). I estimate that it represents over $500 million in annual visitor expenditures and more than 5,500 jobs for the visitor industry alone. (Hawaii Tourism Authority Key Statistics 2014).
Moreover, Poipu Beach Park is one of the most popular parks in the County of Kauai public park system. Families from all over the island frequent the park for major events. Their enjoyment of the park will be compromised and their health will be endangered. The applicant needs to address how it will prevent farm odor from reaching population centers and public parks.

Surface water degradation. Manure and nitrogen will be discharged by cows in the paddocks and left on the land. This manure can be moved by storm water to surface streams and groundwater aquifers. Excess runoff from paddocks irrigated with manure laden water will flow from the storm ditches to Waipioili stream to the Pacific Ocean (Class 1 waters). The high probability of contaminated runoff is exacerbated by the poor soil properties of the farm. According to the NRCS Custom Soil Resource Report, June 2014, the soil is very limited in its ability to handle an animal waste operation. The stream is already highly contaminated as shown by the Blue Water Task Force, Surfrider Foundation.

One theory of this stream pollution is that feral animals are causing the impairment. If this is the case, then what will happen when 2000 more animals are on the land, with manure and urine being left in place. There is significant risk of further pollution to receiving ocean waters. The applicant should address why it has chosen this location with proven unsuitable soils and already impaired streams, and how it will prevent contaminated runoff from reaching the Waipioili Stream and Pacific Ocean.

Public drinking water contamination. Kauai relies on groundwater for its potable water. The proposed dairy location is too close to public drinking water source Koloa Well F and should be rejected. The dairy site is on the watershed that feeds the aquifer for public water wells. Nitrate, bacteria and manure can leak into the groundwater and contaminate the drinking water supply. The applicant should complete a detailed groundwater study, including such topics as the exact location of the well recharge zones, as well as where groundwater recharged by the dairy discharges to wetlands, streams, and springs.

The plan should address the location of the calf cemetery relative to water sources, both surface and groundwater, and describe all actions that will be taken to avoid contamination of water by dead animals. The plan should identify all wetlands in the area.

In addition, locals report that there are fresh water springs that bubble up on the beach near Gillen Cottage and appear in the Makauwehi Cave. The plan needs to demonstrate the hydrological link, or lack thereof, between these springs and the groundwater underneath the proposed dairy.

Biting flies. Massive amounts of manure left on the paddocks by grazing cows create a moist and attractive breeding environment for sucking flies that exist on blood meals. According to Carlos White, Industrial Entomologist (letter to Mayor Carvalho, dated October 13, 2014) “one fertile fly can result in billions of descendants within a few months’ time” . . . the house fly is capable of at least a 5 mile dispersal from its origin, and probably more with the winds of Kauai, this would include much of the Poipu area . . . would be subject to clouds of very high fly populations throughout the year.” The plan must address how fly populations will be prevented from reaching and injuring the local and visitor populations. Specifically, the plan should address what types of chemicals and integrated pest management systems will be employed, and address why these systems will be effective when other large industrial dairies have not been successful in controlling flies or other vector.
Noise. Calves are typically separated from their mothers 3 days after birth. This results in loud bawling from the calves and distress calls from the mothers, day and night. Moreover, cows in heat call loudly for three days or more. This noise cannot be controlled or suppressed. The applicant should address how this noise will not constitute a nuisance and noise pollution, especially at night, when the trade winds typically abate. The plan also should address how the constant humming of the milking machinery and irrigation systems will not disturb the nearby residential community and visitor destination area.

Animal disposal after useful life. The plan needs to address the disposition of animals that are no longer productive for the farm, including the killing of bull calves and dying cows. How and where will animal carcasses be processed? At the 2000 herd level, how many animals are expected to be culled on a yearly basis and where will remains be processed and handled? Describe in detail the location of the proposed calf cemetery, its capacity, and processing procedures. Where is it located relative to public drinking water and wetlands? What specific policies and procedures will be followed to protect ground water from decomposing animals? What emergency policies and procedures have been detailed in the event of a flood, hurricane, or other serious weather event? What specifically constitutes an emergency?

Significance Criteria: Is individually limited but cumulatively has a considerable effect upon the environment or involves a commitment for a larger action

The HDF plan does involve a commitment to a larger action (from 699 to 2000) which must be addressed now. All nutrient management plans and waste management plans must be detailed at the 2000 cow level.

Conclusion – Analyses will show that the proposed location must be rejected.

The additional analyses requested above will show that Hawaii Dairy Farms has chosen a location in Mahu'ulepu Valley that is unable to support its intensive rotational farm model without creating significant adverse impacts to the environment, injuring the successful and vibrant economic base, and the hurting the public health of the well-established local residential and visitor community of Poipu/Koloa.

Thank you,

Cornelia Boyle
corneliaboyle@gmail.com
1542 Pe'e Road, Koloa, HI 96756
808-742-8844

December 18, 2014
Ms. Joana Seto
Department of Health
Safe Drinking Water Branch
P.O. Box 3378
Honolulu, HI 96821-3378

Dear Ms. Seto:

My name is Cornelia Boyle, and I have been a property owner and tax payer in Poipu Kai, Koloa, Kauai since 1994. I am writing to you today to express my grave concern about the large industrial dairy proposed for Mahu'ulepu Valley under the name Hawaii Dairy Farms (HDF).

By way of this letter, I am also informing you and other government officials that I wish to be a consulted party in the preparation of the Environmental Impact Statement (EIS) by Hawaii Dairy Farms. I have already subscribed to The Environmental Notice.

I am pro-ag, and I believe it is in our best interests in Kauai to develop more sustainable, more local sources of food. Nonetheless, Hawaii Dairy Farms is too large a project to operate successfully in such a sensitive area as Mahu'ulepu. It is the wrong project in the wrong place. It is a large scale industrial dairy that brings many significant risks to our environment, our livelihoods, and our way of life. It offers minimal benefits to our community.

The risks are numerous:

1. Potential contamination of our drinking water. The proposed farm is too close to Koloa Wells C, D, and F, the source of our drinking water. Moreover, according to HDF’s plan, it is precisely the land nearest the wells that will have additional applications of manure sludge.

2. Poor soil characteristics. The Natural Resource Conservation Service (NRCS), a department of the USDA, published a custom soil study in June, 2014 that concluded that the soil in most of the parcels where the farm would operate are incompatible with an agricultural waste management operation and very limited in the ability to handle the spreading of animal waste, calculated to be 3 million pounds of manure a month! This poor soil condition leads to:

3. Potential for significant contaminated runoff. Since the soil is predominantly clay based, during a rain event, the manure laden water will not percolate in the soil and will run into the ocean, polluting the beach and ocean reefs at Mahu'ulepu. Moreover, according to testing done by the Blue Water Task Force of the Surfrider Foundation, the streams are already significantly polluted, and not one cow has even set foot on the property.

4. Intensive farming is the wrong model in the wrong place. The so-called “New Zealand Dairy Model” has been shown to cause significant pollution of rivers and streams in New Zealand. Why would we embrace a farming model that has already proven disastrous elsewhere?
Dear Cornelia Boyle:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS**: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhū‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 21, 2015, described the proposed pasture-based rotational grazing system...
as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency relates to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in small groups known as “mob”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Small paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai`i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kauai to be raised off-site. The committed herd size of
dairy cow. Over 600 mature dairy cows at the Hula Kauai site apply to mature dairy cows, in addition to cows for other Ranch Ranch. The NRCS has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this project were undertakers at HFP for understanding available soil material, and the landowner worked to identify potential soils. A second round of independent soil sampling was conducted in 2015, and focused on evaluation of subsoil conditions. The most abundant soil types at the HDF site are Kahihi Clay at 32 percent, Kauai Clay at 12 percent, and Kauai Clod at 10 percent. Soil samples collected at each site were analyzed for laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH. USDA NRCS has a "Custom Soil Resource Report for Island of Kauai" which was approved by the U.S. Department of Agriculture's Natural Resources Conservation Service for Island of Kauai, with a November 2015 publication date. The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data
to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

**ARCHEOLOGICAL AND CULTURAL:** The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic era cultural materials associated with the many Land Commission Awards in the project area were nonexistent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhāulepū Ahupua‘a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

**FLORA AND FAUNA:**

Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECS Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened or proposed for listing under Federal or the State of Hawai‘i’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plant species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhāulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kauai may overly the site. The endangered Hawaiian goose, nēnē was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nests on or adjacent to this site as this species nests in the general Kōkua area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to project-specific areas, marking tall structures and fencing with white visibility polystyrene, limiting nighttime lighting, and reducing any outside lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures,
including an Avian Species Protection Plan. Mitigation measures are further described in EIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

INVERTEBRATE SPECIES: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā‘ulepū area, as well as the parasites and predators on site that control those species. Fieldwork was conducted during September 15-16, 2014. The entire study is included in Draft Environmental Impact Statement (EIS) as Appendix B.

CAVE AND LAVA TUBE INVERTEBRATES

There are no known caves or lava tubes found at or adjacent to the dairy farm property. The Kōloa Lava Tube System, which provides habitat for two endemic cave species, the Kaua'i Cave Wolf Spider and the Kaua'i Cave amphipod, is located several miles away from the dairy farm property. Both invertebrates are listed as endangered under the U.S. Endangered Species Act. Not all caves in the Kōloa area contain these invertebrates, as many do not contain the optimal climatological conditions required by these organisms. Neither the botanical and faunal survey nor the invertebrate survey revealed any evidence of lava tubes or caves on the property, and no such features have been reported for the area near the Hawaii'i Dairy Farms (HDF) site. Thus no cave invertebrate species will be affected by the dairy farm.

INTRODUCED PREDATOR INSECTS

An invertebrate study of manure-associated insects was conducted for the Draft EIS. The study included a field survey that used manure from an adjacent cattle herd as a lure, and determined flies and other manure-related insects currently present at the HDF site. Pest insects such as flies can negatively impact livestock health and production, and are therefore actively managed to prevent stress and loss of productivity at dairy operations.

At the HDF site, two common flies were identified: the stable fly and the horn fly. Both of these flies are widespread throughout the Hawaiian Islands. The greenbottle fly was reared from manure taken back to a laboratory following the field survey. Additionally, flies known to exist on Kaua‘i but not seen at the HDF site during the survey were identified and include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations.

In response to cattle-related insect pests, numerous species known to compete with the pests were introduced to Hawai‘i between 1896 and 1982. Twenty species of predators and competitors to the horn fly were successfully established during that period. Cattle egrets break up dung patties while searching for prey, and were introduced to Hawai‘i in the late 1950s to control cattle-associated insects. Extensive introduction of dung beetle species resulted in 14 dung beetle species becoming established on Kaua‘i.

A healthy population of dung beetles can bury a dung patty in one to three days, which disrupts reproduction of flies such as the stable fly and horn fly. The stable fly requires approximately 21 days within the dung patty for the immature life stage (egg to pupa) to survive; the horn fly takes 10 to 20 days from egg to adult. Incorporation of the manure into the soil profile by dung beetles removes the habitat these flies require to complete their lifecycle. Research shows that 95 percent fewer horn flies emerged from dung patties containing a dung beetle species that has been identified at the HDF site. Proven control methods for the stable fly include parasitic micro-wasps and spreading out manure.

Among the invertebrates previously introduced to Hawai‘i to combat livestock-related flies are extremely tiny parasitic wasps that prey on various fly species. The male wasp has no such “stinger” – the female lays eggs in the larva or pupa of flies. The scale for these tiny, non-stinging wasps.

To minimize potential establishment of pest flies or other insects, food waste generated during the construction phase will be bagged, covered, and disposed of in order to limit possible breeding habitat for flies. Inspections of building materials for ants or other insects will be conducted to prevent introduction of new pests to the HDF site. Short-term controls, including mechanical methods (e.g. sticky tapes or ribbons in the milking parlor, or traps with or without attractants) and chemical methods may be used to prevent short-term spikes in pest populations.

Insecticides and herbicides are non-discriminatory and kill beneficial as well as pest insects. Beneficial insects include primary decomposers such as earthworms and dung beetles, and pollinators including bees. Should chemical control be needed for short-term spikes in pest population, application would be by those qualified, and in accordance with regulatory labeling requirements. HDF will implement long-term integrated pest management, which utilizes knowledge of the ancient food web among species by disrupting the manure habitat required to complete the fly life cycle. HDF and other ranchers on Kaua‘i may choose to engage with the State Department of Agriculture to translocation dung beetle species already introduced on Kaua‘i to Māhā‘ulepū and other areas where manure-related flies may be a problem.

IMPACT OF SPRAYS ON BEES

Beneficial insects include primary decomposers such as earthworms and dung beetles, and pollinators including bees. Honey bees are an essential part of any agricultural ecosystem, and were observed on site during the invertebrate species...
survey. Pesticides and herbicides can reduce populations of beneficial insects, which is why HDF will utilize an integrated pest management approach.

It is expected that honey bees will visit water sources set up for the HDF herd. Preventative measures will be built into any open water source to prevent bees from being trapped, and HDF will contact local beekeepers for advice regarding any bees or bee colonies encountered on site. Safe application practices for any unavoidable herbicide or pesticide will be utilized in order to narrowly target the correct pest species without harming other insects and animals in the area. Anyone using herbicides or pesticides will be properly trained and informed, and if a honey bee colony location appears to be a danger to workers or cattle, or to be in danger itself, a local beekeeper will be contacted for advice and removal.

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhāʻulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly and the chicken dung fly. These pests are common in areas with high pest populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for Drosophila muscae, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-ʻōhi‘a forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhāʻulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pats in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōloa-Pu‘u‘i region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Kōloa and Pu‘u‘i, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animal waste within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

NOISE: Existing noise conditions of the project site and the surrounding Māhāʻulepū Valley area are evaluated in the Draft Environmental Impact Statement (EIS), along with anticipated short-term and long-term noise conditions associated with the dairy farm and planned mitigation actions. Draft EIS Section 4.12 addresses noise conditions.

Noise can be defined as unwanted sound, a sound that is considered loud or unpleasant, and/or sound that causes disturbance. Research related to noise and livestock focuses on noise levels and minimization of unexpected sounds that cause undue stress on cows. Noise stress results in loss of livestock productivity and thereby financial loss to farmers and ranchers. Little research exists on the sound levels from livestock.

Sound is measured in decibels (dB). The State of Hawai‘i Department of Health (DOH) rules use the A-weighting sound network (dBA) in the HAR §11-46, Community Noise Control. Sound through the air is similar to ripples on a pond of water. In open space without reflection, ripples spread uniformly in all directions and decrease in amplitude further from the source. In free field conditions such as outdoors, amplitude drops by half as distance doubles (OSHA, 2016). When sound passes close to absorbing ground cover such as grassland and fields, the “soft ground” absorbs extra sound as it passes. The Hawai‘i Dairy Farms (HDF) site in Māhāʻulepū Valley is approximately 2 miles from the resort area, and 1.5 miles from the closest residential areas on land zoned for agriculture. Typical noise currently generated near the HDF site includes truck ingress/egress along private farm roads, agricultural equipment, and cattle and sheep.

Construction work at the project site will involve activities that may generate an increase in noise levels. However, such exposures will be a short-term condition, occurring during daylight hours. Construction vehicles and activities must comply with DOH Administrative Rules. DOH noise control regulation requires a permit for construction activities that emit noise in excess of 78 decibels or that cost a total of more than $250,000. Mitigation measures to minimize construction noise will include the use of mufflers to suppress loud equipment and limitations on the hours of heavy equipment operation.
ADDITIONAL 5 FULL-TIME FARM JOBS WOULD BE ADDED, WITH APPROXIMATELY 15 ADDITIONAL INDIRECT FULL-TIME FARM JOBS. THE STATE WILL DERIVE APPROXIMATELY $360,000 ANNUALLY IN REVENUES FROM THE CONTENDED 2,000-MATURE DAIRY COW DAILY.

DEMOGRAPHIC AND ECONOMIC: The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, concrete workers, iron workers, painters, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs per year during the development period. Thus direct-plus-indirect employment associated with the HDF project would be expected to average approximately 36 jobs, of which 28 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For ongoing operations at the contemplated herd size, an additional 6 indirect equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect full-time equivalent jobs on O‘ahu would be created on dairy.

WATER QUALITY: The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater systems in the region. The alluvial material blanketing the valley floor is less permeable than the sandstone aquifer of highest value and uses deep wells within the unweathered Mi'au lava flow, while the alluvial material containing the sandstone aquifer, which generally extend about 60 feet under the surface and is underlain by highly weathered lahars, is comprised of dark brown to black clayey clay and clayey silt. The alluvial material containing the Mi‘au lava flow is less permeable than the alluvial material containing the Mi‘au lava flow.

...
Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā'ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Groundwater Monitoring:**

Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua'i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Pu'ipō region shows large and increasing demand for potable water for community and resort development.

**Surface Water:**

The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua'i will increase county-wide by 17,300 residents by 2030. The South Kaua'i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua'i region (the Kōloa- Pu'ipō - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island's infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Potable Water:**

Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaii Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (9.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā'ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā'ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occurs are isolated and hydraulically separated from shallow groundwater in the Māhā'ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Surface Water Quality:** The Kaua'i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā'ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.
current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kūloa-Pōipū region were also calculated. Nitrogen input to the marine environment in the Pōipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pōipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs in several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CBW to conduct a "Sanitary Survey" of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part 1 of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CBW noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.gov/cwb).

Long-term Operations. Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established within the whole ditch area. Stream crossings that could capture particulates during stormwater runoff will have a 150-foot setback from waterways. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment from the
monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua'i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. ER sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai'i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua'i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year; within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

GREENHOUSE GASES: Draft Environmental Impact Statement (EIS) Sections 4.19 and 4.26 address the potential for greenhouse gas emissions by Hawai'i Dairy Farms (HDF). Estimates of GHG emission rates from a pasture-based dairy, including...
methane and nitrous oxide, were calculated using the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories. Parameters for Oceanic dairy cattle in warm climates were selected as most applicable to conditions at HDF. Long-term operational impacts were modeled using the IPCC guidelines and conversions, and estimated the emissions potential for GHG at the dairy at the committed herd size of 699 milking cows to be 2,693 CO2e metric tons per year. This equates to roughly 1.02 percent of the utility power generation sector on Kaua‘i in 2013, which does not include vehicle emissions and other GHG emitters on the island.

Potential GHG emissions for HDF at the contemplated herd size of up to 2,000 milking cows was modeled as described in Section 4.19.3 using the IPCC guidelines and conversions. The estimated total of 7.702 CO2e metric tons per year (6,490 tons) is 5,009 CO2e metric tons (5,521 tons) greater than the committed herd size of 699 milking cows. This equates to an increase equivalent to 1.91 percent of GHG produced on Kaua‘i for power generation by the utility in 2013 (KUIC, 2014). Power generation does not include vehicle emissions and other GHG emitters on the island.

While the presence of cows may increase GHG, a long-term beneficial impact of the grazing fields is the sequestration of carbon as CO2 captured by the process of photosynthesis by the grass. According to recent studies in the Soil Science Society of America Journal, converting formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, which enhances soil quality, grass production, and has the potential to offset up to one-third the annual increase in CO2 production of an area.

**ALTERNATIVES:** As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location, and (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i. The alternative of "No Action" is also evaluated. One additional alternative, considering a scenario for the Dairy Products at an Off-Island Facility, was evaluated.

Although the alternative approaches are potentially reasonable uses under existing zoning and neighboring uses, they each fail to comprehensively fulfill the requirements defined with the five established Evaluation Criteria (IV). The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State's fresh milk demand, reducing dependence on imported milk (Criterion I). This alternative, however, would not be pasture-based and could negatively affect air and water quality.
- None of the alternatives would include a dairy location that meets the requirements of a pastoral, rotational-grazing dairy minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion I).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, livestock management, environmental resources management (Criterion 2). However, the purpose and need to provide fresh fluid milk would only be met with the Conventional Feedlot Dairy Alternative.
- The alternative for Agricultural Park could also develop sustainable fruit production utilizing Important Agricultural Lands, demonstrating the importance of long term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3).
- After many years, Grove Farm encountered limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Criterion 5) the four alternative scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast, the planned agricultural operations of Hawai‘i Dairy Farm, were determined after substantial analysis to be the most viable option and is the
preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the five Evaluation Criteria (Section 2.3.4):

Hawai'i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai'i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

- The planned dairy location that meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua'i, including pasture agronomy/soils science, livestock management, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100% of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Criterion 5).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai'i Dairy Farms”: [http://hawaii.com/OEQCAHAI](http://hawaii.com/OEQCAHAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

Feb. 21, 2015

State of Hawai'i
Department of Health
1250 Punchbowl Street
Honolulu, HI 96813.

Re: EIS/Hawaii Dairy Farm

Dear Ms. Laura McIntyre,

I am shocked the Hawaii Dairy Farm idea has progressed to this point. I have investment property in Poipu Kai and will be selling out soon if this Farm continues to gain momentum. This Farm would have substantial affects on the economic and social welfare of the community of Poipu. But that is just the tourist industry affects. The impact of the Dairy Farm on the environment, water quality, air quality, and most likely the public health would be tremendous. These concerns need to be addressed and answered by the EIS. I trust that the State of Hawaii will ensure the EIS is thorough, comprehensive, and honest. And I hope the Hawaii Dairy Farm refrains to another area more suited to that activity.

Sincerely

Judith E. Brendel
3221 Creekside Dr
Anchorage, AK 99504
May 26, 2016

Judith E. Brendel
1221 Creekside Drive
Anchorage, AK 99504

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Mānāulepū Road
Kaua'i, Hawai'i

TMK: (4) 2-9-003-001 portion and 006 portion
(4) 2-9-001-001 portion

Dear Judith E. Brendel:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

Your comments were received by the State of Hawai'i Department of Health Environmental Planning office. The Department of Health forwarded a copy of your comments to Group 70 International in order to be included in the Draft Environmental Impact Statement (EIS) analysis. This letter was prepared in response to your comments.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai'i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua'i, and 8 on O'ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua'i.

The HDF project would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai'i Island), approximately 10 percent of Hawai'i's milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. Ongoing dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua'i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to ongoing dairy operations would be created on O'ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (367,197,800 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai'i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua'i, and 2 indirect jobs on O'ahu for a total increase of 9 jobs. For ongoing operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua'i and another 8 indirect jobs on O'ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.
WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16.1, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area's hydrology is shaped by its geology. The Kōkua area was built by Napali formation lavas of the Waimāne volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saporlite, a soft, thoroughly decomposed rock. The Māhāʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōkua series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils near the adjacent Kōkua-Poʻipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanicseries and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD) of potable drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County's Kōkua F well will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōkua F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16.1, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface
Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhūulepī watershed. The HDF site is located on the bottom-land of the upper Māhūulepī Valley, which is fed by several intermittent streams coming off of the south slope of the Ha'upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhūulepī Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data; however, DOH was unable to utilize the data as it did not meet Clean Water Branch quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore or off-site water bodies from the facility. CWB conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey of the Māhūulepī and adjacent watersheds, DOH conducted water sampling within the Waiopili Ditch and area upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhūulepī Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/owh).

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhūulepī and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and area upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhūulepī Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/owh).
Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaiʻi has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy operations include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST
Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kauaʻi, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR
Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.
Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odor would not extend beyond 2,700 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OIEC website at the following URL: search "Hawaii’s Dairy Farms": [http://biturl.com/0EEXXAI](http://biturl.com/0EEXXAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

Aloha,

I have very serious concerns about the proposed dairy at Mahaulepu Valley on Kauai. I am glad that an EIS will be prepared and hope that it will address the many issues, environmental, social and cultural, that a dairy in this location presents. While HDF states they are voluntarily doing this process, to truly be pono, this should have been done well in advance of any infrastructure changes or the announcement that a dairy IS going in at this location, as the EIS is designed to determine whether a project like a dairy should go in by providing substantive data that indicates that it will not be environmentally, culturally or socially harmful.

NUMBERS

Beginning with the proposed herd and the recent “reduction” in herd size to 699 (a significantly chosen number as 700 cows is classified as a Large Confined Animal Feed Operation). What is not noted by HDF with this revised herd size is that 699 cows will be shipped in pregnant, thus there will be double that number after gestation. Males will then be thinned out through outsourcing and killing of a certain amount, so that 699 would be about 900 cows on the land after gestation. Regardless of this claim of a reduced herd size, the EIS must evaluate the plan based on the proposed final herd size of 2,000.

WASTE

According to the EPA, waste estimates for dairy cattle are equivalent to 164 times the amount of humans, thus the 2,000 cows would produce waste equivalent to approximately 328,000 people, fully 5 times the population of the entire island. Microorganisms causing health risks to humans like E. Coli, enterococcus and leptospirosis are common in the feces of cattle, these organisms could likely end up in the adjacent streams leading to the ocean as well as groundwater.

SOIL

HDF should be required to do a detailed, accurate soil survey to determine once and for all if the soil is able to handle the amount of waste that will accumulate and be applied via airborne spray as fertilizer. Again, had HDF followed proper protocol and done an EIS at the outset, perhaps they would have provided more accurate information on the soil in the area in question. Their initial plan stated that soil in the area was porous volcanic, which it is not. A later NRCS survey of the soil indicates that most of it is primarily clay with “very limited” capability to handle manure load and has a high potential for runoff.

DRINKING WATER WELLS

HDF should be required to do an extensive groundwater study to assess effects of waste applied to the soil. Their current Waste Management Plan does not identify all of the nearby drinking water wells and misrepresents the distance of some of those that are identified on the map. Most significantly, one well (Koloa F) is very near to the area in which their wastewater treatment plant will apply the sludge that accumulates in the ponds.
AIRBORNE CONTAMINANTS
HDF plans to spray waste from the effluent ponds on the fields as fertilizer. These spray machines are very tall and with dominant trade winds the possibility of spray affecting homes and businesses downwind is a potential problem. The EIS should address airborne contaminants produced by the dairy and the environmental, health, and social impacts.

SOCIAL CONCERNS
The Mahaulepu area is popular for nature oriented activities and subsistence such as fishing, hiking, beach-going activities, bird watching and more. The EIS must address how these activities would be impacted by environmental effects from a large dairy of this size upstream of the beach-going area.

The Kolaa/Poipu area is home to approximately 3,000 residents, all of whom will be downwind of the dairy and thus affected by any airborne contaminants or odor. The area is also one of the top 3 visitor destinations, providing significant income to both County and State through property, TAT, general excise and other taxes. Environmental air, water and vector control concerns from the dairy would reduce property values and make the area less desirable to visitors. The largest private employer for the island is within 2.5 miles of the proposed dairy and a thriving visitor industry encompasses the entire Kolaa/Poipu area, a decrease in visitors to the area would adversely affect those employers thus causing loss of jobs and income for island residents. Reduced property values and visitors to the area would not only affect the local economy through loss of jobs/decreased incomes for residents, but reduced revenues for the State and County as well.

The above noted concerns should all be fully addressed by the EIS for Hawaii Dairy Farm's proposal at Mahaulepu Valley. Given the open, available, leasable land on the island, particularly that owned by lessor Grove Farm, this seems to be one of the most ill-suited locations for such an operation. Its proximity to freshwater sources, the ocean, nearby homes and businesses make this an extremely poor location for a dairy, especially given that all milk will have to be trucked to the port in Nawiliwili for shipment to Oahu for processing. The above noted environmental, health & social concerns in addition to this fact, render this a plan that will negatively impact the environment and economy of Kauai.

Mahalo for your careful consideration of my concerns and your diligence in evaluating the impacts of this project.

Katy Britzmann | Director of Sales
Grand Hyatt Kauai Resort & Spa
p 808-240-6427 c 808-635-0243

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May 26, 2016

Katy Britzmann
Katy.britzmann@hyatt.com

Subject: Hawaiian Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001: 001 portion

Dear Katy Britzmann:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

Your comments were received by the State of Hawai‘i Department of Health Environmental Planning office. The Department of Health forwarded a copy of your comments to Group 70 International in order to be included in the Draft Environmental Impact Statement (EIS) analysis. This letter was prepared in response to your comments.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

SOILS: Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during dry periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes...
soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawai'i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soils Resource Report for Island of Kaua‘i, Hawai‘i.” The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kāhī Clay at 32 percent, Ka‘ena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management through establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained,” and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas “drainage” refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential for impacts on waterbodies. In this way, "poorly drained" soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than "well drained" soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS implementation of conservation practices, NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil & Water Conservation District in December, 2013.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

DEMOGRAPHIC AND ECONOMIC The potential impacts of Hawai‘i’s Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plach Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. Ongoing dairy
operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua'i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O'ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai'i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua'i, and 2 indirect jobs on O'ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua'i and another 8 indirect jobs on O'ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $80,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area's hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāʻulepu Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepu Valley and the HDF site ranges from 105 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poʻipu region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepu may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational, at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater produced by the on-station well. The State of Hawai'i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepu 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepu 14 well and the County's Kōloa F well will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.
Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ule‘pū Valley, HDF established a 1,000-foot setback surrounding the Kōloa Well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipu region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipu - Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ule‘pū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ule‘pū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ule‘pū Valley, which is fed by several intermittent streams coming off the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ule‘pū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction

Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data; however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ule‘pū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhā‘ule‘pū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ule‘pū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Geo Water Branch website under "Library" (http://health.hawaii.gov/cwb).

Long-term Operations, Surcharges and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, US Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways;
only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application.** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāle‘pali will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). All of this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōlos-Po‘ipi‘u region were also calculated. Nitrogen input to the marine environment in the Po‘ipi‘ region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipi‘ region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment.** An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively dispenses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Ka‘au community.

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft BS Appendix I.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy operations include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

**DUST**
Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the Island of Kaua'i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m3, well below the State standard of 150 μg/m3. The estimated concentration for PM2.5 is 0.23 μg/m3, well below the Federal standard of 35 μg/m3 (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.
We appreciate your voluntary preparation for an EIS.

My deepest concern is for the erosion of what has been voted among the most beautiful of tropical islands.

What has happened to stewardship of the earth?? What has happened to respect for cultural and spiritual treasures? What will happen when your dairy project has ruined Kauai’s first economic base, i.e. tourism, when waste and run off have contributed to more pollution of already precarious water conditions??

It has become very clear from numerous articles and reports in the TGI that a ‘Zero-Discharge, Grass-Fed Dairy based on the New Zealand model’ is a non starter. According to eyewitness reports these beaches in New Zealand are now polluted. Stench and flies are rampant. How will and can Hawaii Dairy Farms bring back this precious part of Kauai once it has been spoiled?

Furthermore, is your mission statement about providing Hawai‘i’s families with fresh local milk true, or is it merely a cover up for sending the milk ultimately to China? Where do you propose the milk be processed?

Any EIS should take all of the above mentioned issues seriously into consideration.

Respectfully submitted,

Liedeke Bulder and Dick Wright
Kalaeo residents
(CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the feedstuffs consumed by cattle, resulting in zero discharge. However, HDF elected to discontinue use of the term “zero discharge” as it was misconstrued as no nutrients into the system.

The term “grass-fed” was used in the HDF EIS PNP. This term was used to identify feedstuffs consumed by cattle, which are not confined within feedlots. The term “grass-fed” is used because the animals have access to open land and exercise while they forage.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. The irrigation system is controlled using computer software and GPS receivers to allow for precise application of irrigation and/or diluted effluent on different paddocks.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially identified sufficient yield and nutrition to supply 70 percent of the cows' diet; improvements in grass productivity are anticipated to provide up to 95 percent of the cows' diet.

The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.1 and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate up to 30 days of storage for up to 2,000 mature dairy cows, and over 65 days of storage for 699 mature dairy cows. The storage ponds will be highly unlikely to be full at any time for the committed herd size of 2,000 cows, and virtually impossible for the committed herd size of 699 cows.

Animal manure and slurry are applied to the various irrigation systems on the farm. The results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet, improvements in grass productivity are anticipated to provide up to 95 percent of the cows' diet.
other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

**DEMOGRAPHIC AND ECONOMIC** The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the tourist industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $60,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $80,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the DEQ website at the following URL, search “Hawai‘i Dairy Farms”: [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Joanne Burkhardt
P.O. Box 743
Hanapepe, HI 96716

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā'ulepū Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Joanne Burkhardt:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing milk method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animal's diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPEN) published January 23, 2015, described the proposed pasture-based rotational grazing system as a "zero-discharge, grass-fed dairy." The term "zero-discharge" under the U.S.
Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed.” The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed,” the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “light matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulupu site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mohs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels. Cows last milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulupu site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā‘ulupu site applies to mature dairy cows.
Animals in various stages of lactation and rest will be transferred between HDF and annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, the potential for improvement in milk production with the implementation of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

WATER QUALITY: Technical consultants conducted field studies and analyzed groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawaii Dairy Farms (HDF) project. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement and F. The location and connectivity of groundwater bodies were determined.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State of Hawai‘i (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally produced, filling a void caused by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths—as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a mixture of brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified the quality of groundwater and surface water was documented. The groundwater and surface water analysis is described in the Draft EIS and F. The groundwater bodies within the valley, (1) groundwater bodies within a deep aquifer system within unweathered volcanic material which is underlain by highly weathered lava at a shallow depth by secondary-eroded remnants of the Kilauea Volcano, and (2) groundwater in the thick alluvium that covers the valley floor. The state will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow herd.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawaii Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report, prepared in April, 2016, by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.
quality, existing data on water quality for both groundwater and surface water were collected. The comparison between conditions prior to, and during, HIF operations is critical for assessing the project's environmental impact.

The alluvial material blanketing the valley floor is less permeable than the groundwater in the deep aquifer. This difference in permeability leads to a hydraulic conductivity variation of more than two orders of magnitude. Hydraulic conductivity represents the ability of the soils to transport water given a hydraulic gradient, and it is expressed in centimeters per second. The permeability of the alluvial material is significantly lower, making it more difficult for water to move through this layer.

Future monitoring will allow for a comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Rule and EIS staff, ensuring that any potential issues are managed effectively.

### Regional Water Demand:

As per the Draft EIS, the need for groundwater increases due to population growth and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the potential increase in water demand to be 10.5 to 50 feet per day. The hydraulic conductivity of the soils in the alluvium is such that water movement through these soils is slower than the neighboring area. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

### Surface Water

The Surfside Foundation and associated infrastructure facilities within the area will not impact the County drinking water well. The water body in which the County well occurs is contained and thus remains a part of the groundwater cycle. Long-term ground water will not impact the County's drinking water well.

**Groundwater Quality:**

The proposed well field will result in no adverse impacts on the quality of groundwater in the surficial zone of the alluvium. Therefore, the draft EIS provides that the proposed well field will no longer be associated with surface water quality issues.

**Groundwater Monitoring:**

Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water movement through this layer. The monitoring will allow for the assessment of potential impacts on water resources and will be shared with the Department of Health Clean Water Rule and EIS staff.
fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future and provided contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Graz yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the BES provides additional information. The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants Inc. (MRCI). Surface water from the Waipōli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline. The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water
masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaii Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

February 19, 2015

Group 70 International, Inc.
925 Bethel Street, 5th floor
Honolulu, HI 96813

RE: Hawaii Dairy Farms

Dear Sirs:

I am adamantly opposed to the proposed industrial dairy in Maha‘ulepu Valley. It is unconscionable for anyone to consider doing something so damaging to ALL aspects of the environment, as well as endangering the health and economic welfare of the community. It is of utmost importance for these issues to be addressed and answered by the EIS.

Very truly yours,

Mrs. Robert E. Burns
Owner, Kahala 223
12512 Fraser Avenue
Granada Hills, CA 91344-1321

Cc: file
Dear Mrs. Robert E. Burns:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawaii. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

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Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 5.5, Pasture Management.

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management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

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Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāʻulepū site applies to mature dairy mature cows.

Animals in various stages of lactation and rest will be transferred between HDF and other partner dairies and ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling and treating animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as BST or rBGH.

DEMOGRAPHIC AND ECONOMIC:

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annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

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http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear George and Donna Carrick:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai'i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

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The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua'i, and 8 on O'ahu. Construction
employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 12 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 44 million gallons (36719780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $9,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waima‘u volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is composed of dark brown to black silty clay and claysilt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 - 50 feet per day. The hydraulic conductivity of soils in the adjacent Kūalo-Poipū region is on the order of 201 - 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results show that there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD). Of potable (drinking water quality) water from groundwater provided through an on-site well, The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane production.
plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County's Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,400 residents by 2035. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalāheo districts), water use in 2015 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the public citing the high levels of enterococcus in Waiopili Ditch, and concerns about the proposed dairy prompted CBW to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The demo canoe along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CBW noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations: Surchases and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or...
maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kāloa-Po'ipū region were also calculated. Nitrogen input to the marine environment in the Po'ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downward from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waioipi Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kauai community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odor and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai'i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the
NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4.19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670 - feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawaii Dairy Farms”: http://tinyurl.com/OEQCKUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
I am writing to express my dismay concerning plans to establish an extensive new dairy in the Mahawulepo Valley of Kauai, as proposed by Hawai‘i Dairy Farms. I understand that an environmental impact statement will soon be prepared. It should be obvious to all, that this dairy, as planned, will have a certain detrimental impact on many areas of our environment. In addition, both the economic impact, and negative social impact to our community, would outweigh any potential advantage for Kauai.

I currently spend approximately two months on Kauai as an owner of a condominium in Poipu. We bought there, knowing it is one of the most beautiful and enjoyable places imaginable. This beauty will be affected, and the lives of all of the permanent residents, guests and tourists will be adversely affected by the dairy’s plans.

From a public health perspective, it is clear that the toxic waste produced by the initial 690 cows is in itself a threat to the water supply. The expansion to 2000 cows will overwhelm the system. The amount of manure and urine produced, and kept locally, will produce run-off. Nearby streams, specifically the Waioli and Waialaeau will be contaminated and ultimately the runoff will enter the ocean, and the shoreline, upsetting its already fragile ecosystem. The soil in our area, being clay based, cannot handle this very large toxic load. Millions of pounds of manure and urine waste produced annually cannot be resorbed. Our reefs are at stake. We have protected species of ocean and shore birds that will suffer as a result as well.

Furthermore, this toxic waste will be deposited near county wells that serve the population of Poipu and Koloa. We cannot tolerate this potential risk and its longstanding and serious consequences to our water system.

I have recently, as I suspect you have as well, stories in the Garden Island newspaper, reporting the problems which already exist with pollution in the Vaioli Stream. While it is uncertain whether this comes from feral pigs or possible human contamination, it should be obvious that 2000 cows will add significantly, perhaps catastrophically to this problem. How could it not?

I have read the information put forth by Hawai‘i Dairy Farms in their EISPN. It speaks of utilizing a New Zealand technique for management on the dairy farm. Having just travelled through New Zealand, and seeing many cows grazing there, I would point out some important differences as I see them. First of all, the area of New Zealand is quite large, with vast rural spaces, and the cows appear to be considerably further from residential and tourist areas. The density of the cows would appear to be far less than what is currently planned for our area on Kauai. And lastly, and importantly, there are problems and concerns even in New Zealand that we heard about while travelling there, regarding these same issues, so it should not be assumed that by following some of their methodology, that the dairy would clearly avoid the problems that are bound to occur.

With regards to the economic and social welfare to the community, one can only conclude that overall, this proposed dairy will have profound negative affects. The beauty of the Island is at risk. Living in California, and driving by some of the cattle farms there, would convince you not to buy in or visit Kauai, if a dairy of this size and location is permitted. The odors produced will be substantial, and be wind swept to many areas. The wonderful outdoors, enjoyed by me and others as we visit the beaches and shoreline, will no longer be attractive. I enjoy hiking, biking, and snorkeling, and all of these activities will be impacted. Furthermore, cows will attract flies, and with all of the manure and urine produced and staying locally, these flies and other insects will become an appreciable problem causing discomfort and health risks to our residents and visitors. Do we expect the flies to restrict themselves to the dairy farm? I have heard of the possibility of bringing other insects in to help mitigate against the fly population. Perhaps, if that is true, one expects that organism will also be trained to stay within the confines of the dairy farm. We all should learn from the many failed experiments where a predator has been brought in to handle a problem, and then became part of a larger problem, rather than a solution to the original one.

I have already discussed the impact on the water system, and its health consequences.

As all of these impacts develop, tourism will decrease, and direct tax revenues from tourists will be lost. When tourism decreases, jobs will be lost, and tax revenues will decrease further. More will be unemployed, resulting in need for more government assistance. Property values will decline, again with a resultant loss of tax base to the community. Overall, to make up for these losses, additional sources of revenue will be necessary, and taxes to the local residents, who can ill afford it, will have to rise.

I do not understand how our government officials cannot see how potentially devastating this proposal is to so many people. I do not see a milk supply shortage on the island that makes this a necessary benefit for our residents. As the milk will be processed off island, I see no pledge that milk prices will be slashed to benefit our local residents. And since the processing will not be done on Kauai, the number of jobs involved will pale against the number of jobs that will be lost as a result of loss of tourism, and further more reasonable building and expansion on the island.

I imagine that the environmental impact statement could detail ways in which the dairy could mitigate against the many serious insults sur environment and community will suffer from. The key here is that mitigation techniques may reduce the dangers to some degree, but you cannot eliminate the very
May 26, 2016

Michael and Andrea Cassidy
17 Fairlawn Drive
Berkeley, CA 94708
mjcassidy48@gmail.com

Subject: Hawai’i Dairy Farms Environmental Impact Statement Preparation Notice

Māheleōpū Road
Kaua’i, Hawai’i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Michael and Andrea Cassidy:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai’i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**GROUP 70 OBJECTIVITY:** Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai’i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai’i Revised Statutes and the “Environmental Impact Statement Rules” (Chapter 200 of Title 11, Hawai’i Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State and Federal agency. On numerous past EIS projects, the Hawai’i Chapter of the American Planning Association has recognized Group 70’s professional work with Chapter awards for excellence in environmental planning. Part of the EIS scoping process involves Group 70’s

Sincerely,

Michael and Andrea Cassidy
17 Fairlawn Drive
Berkeley, California 94708
mjcassidy48@gmail.com

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Michael and Andrea Cassidy
17 Fairlawn Drive
Berkeley, California 94708
mjcassidy48@gmail.com
experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai’i Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

**DAIRY OPERATIONS:** Hawai’i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhāulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai’i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Draft Environmental Impact Statement (EIS) Preparation Notice (EISPN), published on January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed.” The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed,” the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “moths,” mimicking the natural social order of hordes. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer; productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

The NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and...
irrigation water. Nutrient management is the practice of managing the amount, rate, and timing of nutrients applied to crops. This practice is important in maintaining soil fertility and preventing pollution. It involves the application of manure and other organic materials, as well as the use of chemical fertilizers, to meet the nutritional needs of plants.

Nutrient management practices can vary depending on the needs of the local crop and the characteristics of the soil. In general, nutrient management practices aim to provide the optimal amount of nutrients for plant growth, while minimizing the risk of nutrient loss through leaching, runoff, or surface erosion.

The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance and management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

Sewage storage ponds are sized to accommodate 30 days of storage for up to 2,000-cow dairy. Throughout the less than 30-day storage period, effluent is planned for use as irrigation water. Nutrient management is the practice of managing the amount, rate, and timing of nutrients applied to crops. This practice is important in maintaining soil fertility and preventing pollution. It involves the application of manure and other organic materials, as well as the use of chemical fertilizers, to meet the nutritional needs of plants.

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The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment ministry projections, the project would create 20-30 jobs.

Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and food productivity. This will also ensure that the herd maintains a balanced mix of animals and that milk production continues throughout the year.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling and managing animals to minimize stress and ensure the health and welfare of the herd. A licensed veterinarian will be available at all times to address any increase in population, therefore it is expected that the dairy farm will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

PESTS:

The potential impacts of Hawaii Dairy Farms (HDF) to the existing economy were evaluated in the draft environmental impact statement (EIS) including a detailed impact assessment report completed in April, 2016 by Plasch Economics Pacific.   Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J. The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment ministry projections, the project would create 20-30 jobs.

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be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment associated with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 12 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (367,19780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area’s hydrology is shaped by its geology. The Kūloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Sarpolte, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kūloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 105 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kūloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at greater depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Possible Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD...
Potential Impacts from Construction. The dairy facility and associated infrastructure will be constructed on a 10-acre site that is located within the existing 92-acre HDN site. The 100-foot setback from the HDN site to the County property line is consistent with Department of Water and Sanitation Protection standards.

Groundwater Monitoring: Four groundwater monitoring wells were installed by the HDN to allow monitoring of water quality and quantity. Results from these wells indicate that the shallow groundwater within the alluvium is not impacted by the project.

Surface Water Quality. The project is located on the lower reaches of the Waiopili Ditch, which is a tributary of the Hanalei River. The Waiopili Ditch is a perennial stream with a wide range of water quality. The proposed facility will not impact the stream.

Ridge. These normally dry streams converge into numerous small drainages running through the upslope portion of the Waiopili Ditch. This ditch, named Waiopili Ditch, is located within the 2,200-acre property of the HDN. The Waiopili Ditch drains into the Hanalei River, which flows into the Pacific Ocean. The Waiopili Ditch is a perennial stream with a wide range of water quality. The proposed facility will not impact the stream.

Regional Water Demand: The South Kauai Irrigation District has estimated a water demand of 1.5 million gallons per day for 2025. The majority of this demand is from agriculture. The proposed facility will not impact the water demand.
maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture. Grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipoipio Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the
DUST

Aerodynamic dispersion modeling (AERMOD) results were scaled to the background concentration of particulate matter (both PM₁₀ and PM₂.⁵) measured on Oahu, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.⁵ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4.19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst-case meteorological conditions (low wind velocity/mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670 feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual odors/odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

**ALTERNATIVES:**

As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawaii Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, a potential condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The
alternatives were examined and eliminated from further analysis, however, as they could potentially exceed those anticipated from the proposed project.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.
Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Aloha,

COMMENTS ON HAWAI’I DAIRY FARM’S ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE, DATED JANUARY, 2015.

Why Mahaulepu?? Why not some other Grove Farm leased land? I have always been pro-agriculture. However, even all of you KNOW that this is the wrong place for a dairy. Please do not ignore this special place. Move the dairy to another area better suited for the impact. Not near the ocean, streams and ground waters.

The Mahaulepu area is popular for nature oriented activities and subsistence such as fishing, hiking, beach-going activities, bird watching and more. The EIS must address how these activities would be impacted by environmental effects from a large dairy of this size upstream of the beach-going area. Many children swim and wade in these waters and the last thing we want is another contaminated Black Pot beach or Kalapaki where bacteria levels are extremely high and there is no dairy in the vicinity.

The Koloa/Poipu area is home to approximately 3,000 residents, all of whom will be downwind of the dairy and thus affected by any airborne contaminants or odor. The area is also one of the top 3 visitor destinations, providing significant income to both County and State through property, TAT, general excise and other taxes. Environmental air, water and vector control concerns from the dairy would reduce property values and make the area less desirable to visitors. The largest private employer for the island is within 2.5 miles of the proposed dairy and a thriving visitor industry encompasses the entire Koloa/Poipu area, a decrease in visitors to the area would adversely affect those employers thus causing loss of jobs and income for island residents. Reduced property values and visitors to the area would not only affect the local economy through loss of jobs/decreased incomes for residents, but reduced revenues for the State and County as well.

The above noted concerns should all be fully addressed by the EIS for Hawaii Dairy Farm’s proposal at Mahaulepu Valley. Given the open, available, leasable land on the island, particularly that owned by lessee Grove Farm, this seems to be one of the most ill-suited locations for such an operation. Its proximity to freshwater sources, the ocean, nearby homes and businesses make this an extremely poor location for a dairy, especially given that all milk will have to be trucked to the port in Nawiliwili for shipment to Oahu for processing. The above noted environmental, health & social concerns in addition to this fact, render this a plan that will negatively impact the environment and economy of Kauai.

Thank you for carefully considering these concerns and your diligence in evaluating the impacts of this project in this area. Please choose another area, not Mahaulepu. Please!

Sincerely, Carolyn Caylor P. O. Box 1822 Koloa, HI 96756 808-346-0606
Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā'ulepū Road
Kaua'i, Hawai'i

Dear Carolyn Caylor:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai'i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā'ulepū Valley on the island of Kaua'i to produce fresh, locally available nutritious milk for Hawai'i families. The rotational-grazing method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows' manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP. This term was used to identify HDF's intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds' diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed.” The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed,” the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd's primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient "dry matter" grass yields essential to a cow's diet. Additional project-specific trials at the Māhā'ulepū site on Kaua'i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows' diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs,” mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways
Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of animal welfare to minimize stress and ensure the herd’s welfare. A certified veterinary (Cvo) · U.S. · Co. · EIS · 7 · 0 · HFD · To · benefiting · T · system · be · the · maintenance · of · pasture · and ·, · be · managed · or · restored · to · maximize · grass · as · the · primary · nutrition · source · and · minimize · stress · to · the · animals. · Cows · tend · to · be · healthier · and · live · longer, · productive · lives · with · access · to · fresh · air, · high · quality · feed, · and · exercise · while · dry · age.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be left undisturbed and fenced to protect the corridor. The potential impacts of Hawa'i Dairy Farms (HDF) to the existing ecology will be evaluated in the Draft Environmental Impact Statement (EIS) Section 4.15 addressed in April 2016 by Plasch Economics Pacific.

The 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct jobs on Oahu, construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average approximately 36 jobs, of which 28 would be on Oahu. The potential impacts of the Hawai'i Dairy Farms (HDF) project would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai'i Island), approximately 10 percent of Hawai'i's milk is locally produced. The HDF project, with approval of the established herd size of 2,099 mature dairy cows, will significantly increase local fluid milk production. On-going dairy operations at the committed herd size will result in an additional 6 indirect jobs related to on-going farm operations and another 11 indirect full-time equivalent jobs on Kaua'i, including 4 additional maintenance jobs.

The HDF project is expected to generate a net income of approximately $60,000 to the County when the 2,999 cow herd is established. When the daily milk flow is metered to full capacity, it is expected that 1,100 cows will be on the site, and nearly all milk produced will be consumed on the farm. The project is expected to provide a net income of approximately $60,000 to the County annualized, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct jobs on Oahu, construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average approximately 36 jobs, of which 28 would be on Oahu. The potential impacts of the Hawai'i Dairy Farms (HDF) project would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai'i Island), approximately 10 percent of Hawai'i's milk is locally produced. The HDF project, with approval of the established herd size of 2,099 mature dairy cows, will significantly increase local fluid milk production. On-going dairy operations at the committed herd size will result in an additional 6 indirect jobs related to on-going farm operations and another 11 indirect full-time equivalent jobs on Kaua'i, including 4 additional maintenance jobs.

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production for the 90% dairy herd and income to the State is calculated at $900,000 annually. With the potential for up to 2,000 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater wells. If the operation is expanded, an additional 500 feet per day. The hydraulic conductivity of the alluvial material is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in different units of measurement for soil type. In this case, it is measured in feet per day.

The groundwater and surface water analysis for this Draft EIS examined whether surface water resources in the area, and evaluated potential impacts from the proposed Hawaii Island Dairy Location (HIDL) operations. Existing conditions were described in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

WATER QUALITY:

Technical consultants conducted field studies and evaluated potential impacts from the proposed Hawaii Island Dairy Location (HIDL) operations. Existing conditions were described in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented. The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Kīlauea F fault and the groundwaters in the alluvium, which is the source of drinking water. Should HIDL decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater wells. If the operation is expanded, an additional 500 feet per day. The hydraulic conductivity of the alluvial material is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in different units of measurement for soil type. In this case, it is measured in feet per day.

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Surface Water Quality: The Kaua’i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Måhå‘ulepi Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Måhå‘ulepi and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part 1 of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Måhå‘ulepi Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Hanalei District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain
the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūʻelepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the nonuse contributions would be limited to periods of major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Puʻipū region were also calculated. Nitrogen input to the marine environment in the Puʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Puʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipālī Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaau community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaiʻi has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing
system will be on pasture 22 hours each day and will spend two hours – in two
separate milking cycles – moving to and from the barn for the 10- to 15-minute
milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to
the size of the non-pasture areas used by cows at HDF. Results were added to the
background concentration of particulate matter (both PM_{10} and PM_{2.5}) measured on
the island of Kaua‘i, and the total concentration was compared to the State ambient
air quality standards. Only the contemplated herd size of up to 2,000 mature dairy
cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust
impact would be negligible. The estimated concentration for PM_{10} is 2.01 μg/m³,
well below the State standard of 150 μg/m³. The estimated concentration for PM_{2.5}
is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section
4.19 and Table 4-19.2).

ODOR
Odor emissions are generated during incomplete anaerobic decomposition of
organic matter in manure. No animals or dairy facilities currently exist in the area
leased by HDF, so air dispersion models were used to determine potential odor
levels. Local weather data was used in conjunction with the AERMOD modeling
system, and published rates for manure odors emissions for dairy heifers and
effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture
fields, irrigation water containing diluted nutrients from effluent, the effluent
storage ponds, and the dairy buildings. Odor rates from published research were
applied. Odor isopleths (a line used to map all points having the same numerical
value) were created to display the model findings. Odor is described in “odor units”
at the threshold of perception, which is defined by the point at which 50 percent of
panelists, in laboratory conditions, cannot smell the odor but 50 percent of
the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low
wind velocity / mixing). Generally, tradewinds will disperse odors to less than
detected levels beyond the HDF site; in periods of higher wind, odor may not be
dispersed creating the “worst case” scenario. In these periods without normal
tradewind flow, the odor plume would extend to the south of the HDF site. Sections
4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may
be detectable by 50 percent of the sensitive population once per 200 hours, or 44
hours per year, within an area that extends approximately 1,670-feet (within one-
third of a mile) beyond the dairy farm boundary, and does not reach recreational or
residential areas. Results for the contemplated expanded herd size of up to 2,000
mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF
boundary (just over half a mile), again not reaching recreational or residential areas,
and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were

intentionally conservative, and the impacts shown assume an unlikely confluence of
worst-case meteorological data, irrigation location, and grazing location. Actual
offsite odor impacts are likely to be much lower and/or less frequent than shown; it
is likely odor detection beyond the HDF boundaries will be less frequent.

ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could
attain the objectives of the action’s purpose and need, and were compared with
environmental benefits, costs, and risks of each reasonable alternative against those
of the proposed dairy project. Further discussion of alternatives can be found in
DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s
purpose and need, and compares environmental benefits, costs, and risks of each
reasonable alternative against those of the proposed action. Additionally,
reasonable land use alternatives that emerged from public input during the project
scoping phase are documented and briefly discussed. The alternatives that do not
meet the project purpose are not advanced for analysis of environmental benefits,
costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative
Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could
attain the objectives of the action, regardless of cost. There is no requirement for the
alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed.
Rezoning the land for resort or residential development, or a potential conservation
condemnation are two uses that were examined and eliminated from analysis.
These options would not be reasonably viable given the existing private land tenure
and existing zoning. Two additional alternatives were considered as reasonable land
uses as they could be permitted within the existing State Land Use Agricultural
District and County Agricultural Zoning District. These options include Agricultural
Park with Processing Center, and development of an Agricultural Subdivision.
The alternatives were examined and eliminated from further analysis, however, as they
would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose.
Rigorous exploration and evaluation of the environmental impacts of the
alternatives, including those that might enhance environmental quality or avoid,
reduce or minimize some or all of the adverse environmental effects, costs and risks.
These alternatives include: (1) the development of a Conventional Feedlot Dairy (a
non-pasture-based dairy) at the same location; (2) development of the Pasteure-
Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing
by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of
potential alternatives, including the two alternative development scenarios.
Although the alternatives are potentially reasonable uses under existing zoning and
neighboring uses, each fails to comprehensively fulfill the project requirements
deﬁned by the eight Project Objectives and the four established Evaluation Criteria
(Chapter 2, Sections 2.3.3 and 2.3.4).
The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3).
- However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of feed for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

Carolyn Caylor
May 26, 2016
Page 13 of 14

Carolyn Caylor
May 26, 2016
Page 14 of 14
Lee Cerioni <daystar@aloha.net>  February 22, 2015  1:51 PM
To:  Jeff Overton / Group 70 International Inc
Hawaii Dairy Farm's Environmental Impact statement

Dear Mr. Overton

I am writing you to express my concerns on the proposed dairy to be located in the Maha'ulepu valley and the EIS statement that is to be prepared. I request that I be included in all EIS information as it is presented as I am greatly affected by the outcome.

First of all, Maha'ulepu is one of Hawaii's national treasures with geological & archaeological wonders. It is the drainage basin for much of the south Kauai water supply.

To propose a 2000 head dairy farm based on the intense parameters of the New Zealand dairy models is a disaster. The New Zealand dairy models have been total failures with severe environmental damage. This is a fact not an opinion. The ground water around these dairies has been contaminated, the shoreline and ocean polluted and the people of New Zealand are still trying to deal with the outcome.

Second, the information provided by the Hawaii Dairy Farm (HDF) has been inaccurate as to soil types, distance to county water wells, and their ability to contain the enormous waste that will be a product of the dairy model.

Third, the Maha'ulepu valley already has a severe pollution problem concerning water runoff. The Waipouli stream which drains a large portion of western Maha'ulepu (and it is located directly down drainage from the proposed dairy) already has bacterial counts 100's of times over the EPA guidelines for clean water. There are many reports of people getting infections from crossing the stream and swimming in the ocean water at the mouth of this stream. I can no longer take my family hiking or swimming in this area without real concerns of contamination. This issue is not being addressed by the Dept of Health. Can you imagine what the accidental waste spills of 2000 dairy cattle will do. It will be impossible not to have accidental waste coming from the dairy. If this dairy moves forward at this location, will the pollution ever be solved?

The EIS study is critical to the future of Maha'ulepu. The credibility and non-biased scientific data to be presented is already in question as HDF has chosen the same research group who proposed this project to complete the EIS. The conflict of interest is obvious. This will require very close scrutiny to protect the public from environmental & health hazards, protections of our drinking water and use of our ocean resources.

I am a registered voter in Hawaii and live on the south shore of Kauai. I request that I am presented all information as it becomes available through the EIS process. The community must have a voice in this process.

Mahalo for your time and consideration.

Lee Cerioni
P.O.Box 1259
Koloa, HI 96756
Subject: Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice

Māhū'ulepū Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Lee Cerioni:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agriculture defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed,” the term in not used in this EIS.

The following responses are offered to your comments:

GROUP 70 OBJECTIVITY: Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai‘i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai‘i Revised Statutes and the “Environmental Impact Statement Rules” (Chapter 200 of Title 11, Hawai‘i Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State and Federal agency. On numerous past EIS projects, the Hawai‘i Chapter of the American Planning Association has recognized Group 70’s professional work with Chapter awards for excellence in environmental planning. Part of the EIS scoping process involves Group 70’s experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai‘i Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhū‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.
The pastoral rotational-grazing dairy provides a local feedstock—grass—as the irrigation water. Nutrient management is the practice of managing the amount, rate, and timing of nutrients applied to maintain plant health and soil fertility. Reducing imported feed stabilizes costs and provides a source, method of application, and timing of plant nutrients and soil amendments. The soil-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as "mob," mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural landscapes. The committed herd size of the dairy is based on the average annual daily nutrient requirements of the herd. Throughout the less-than-30-day storage period, effluent is planned for application every 45 days to ensure that the pools are kept at manageable levels.

Health of the herd is of primary importance as the success of a dairy relies on cows lactating milk following the birth of calves. Newborn calves will be housed in the calf barn for the first 90 days, after which they will move to pasture for the remainder of the year. The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigation. The majority of the effluent storage ponds are sized to accommodate 30 days of storage for up to the committed flock size of 699 cows. The ponds will be managed through a hydrologically based modeling system to calculate the volume of water required for the entire herd. The ponds are lined with a geomembrane to prevent leaching. The ponds are designed to provide a high level of water quality, including filtration and treatment of effluent before it is discharged. The ponds are monitored regularly to ensure compliance with regulatory requirements.

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As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS engineering economics, wildlife biology and other disciplines to aid landowners in

The dairy's focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbon in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long-pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōlōa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōlōa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāulepū Valley and the HDF site ranges from 10-5 to 50 feet per day. The hydraulic conductivity of
soils in the adjacent Kōloa-Po'ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area. The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD) of potable (drinking water-quality) water from groundwater provided through an on-site well. The State of Hawai'i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po'ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalahoe districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hā‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waipōlai Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off-site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waipōlai Ditch near the bridge accessing Makawaho Hā‘upu Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore
The groundwater and surface water samples do not indicate the presence of groundwater from the dairy operations at the Waiopili Ditch, which could occur. The Waiopili Ditch provides the major input of freshwater in the immediate coastal area. Water chemistry measurements made by M Mcll identified making of ditch water occurs rapidly and within a short distance of the shoreline. Another setback restricts application of effluent within 50 feet of the drainageways; provision for cattle exclusion from existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices. These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35 feet from the top of the drainageway (totaling 70 feet in width) to keep cows away from surface waters.

The water quality from the Waiopili Ditch is used by people. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from the shoreline. Comparing water masses and toxicity from saline water in any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the potential future contemplated herd size, supplemental nitrogen will be needed, and commercial fertilizer changes. With the additional nitrogen application, the water will be used as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Monoculture practices are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Natural Resources Conservation Service (NRCS). As a result of this, all irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

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Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua'i community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawaii Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

From: David Collison [mailto:davidc@penshurstcl.com]
Sent: Monday, February 23, 2015 12:15 PM
To: EPO; McIntyre, Laura; bbell@gmail.com
Subject: Why Mahaulepu?

Attention Ms Laura McIntyre
State of Hawaii
Dept of Health
Environmental Planning Office

Please find attached my objections to the proposed HDF dairy farm at Maha‘ulepu

Sincerely

David Collison

David HV Collison
President
Penshurst Construction Ltd
P O Box 568
Koloa Hi 96756
Ph 808 742 9944
Fax 808 742 2232
Cell 808 639 2606
Why Maha‘ulepu?

I was born and raised on a New Zealand dairy farm in the Waikato area of the North Island. For the final few years on the property, I managed the total operation.

I am somewhat confused by the oft quoted statement “The New Zealand model” in regards to the proposed HDF dairy operation at Maha‘ulepu. Another well-known quotation is “the devil is in the details” and there seems from press releases to be a dearth of details I would consider relevant. I am not accusing the developer of ignorance but it appears they are convinced the residents of Poipu and Koloa have it in abundance.

New Zealand is approximately 1000 miles long and there is no doubt that it is possible to have a “town supply” dairy farm supplying fresh milk from one end of New Zealand to the other – just as it is anywhere in the world, given enough money. However a successful grass fed dairy herd requires frequent light rain, well drained fertile soil and adequate sun without great extremes of temperature. There are only two main areas in New Zealand that qualify and this is the Waikato area around the city of Hamilton and the Taranaki area around the city of New Plymouth. These two areas are probably the most intense grass fed dairy areas in the world. Forty years ago we milked a total of approximately 200 cows plus an average “dry stock” level of 60 heifers and selected calves – all on 163 acres. No stock feed of any type was imported on to this Waikato farm and I’m told these figures have improved since then. However this climate is ideal for growing nutrient rich grass – particularly clovers which replenish the nitrogen in the soil. These are also grasses that will not grow adequately in a tropical climate. The area is also well away from salt breezes which can burn these grasses and of course the farm consisted of gently rolling well drained soil.

To be successful the cows need to be highly efficient at converting grass to milk and modern cows are a product of many decades of scientific selective breeding largely employing artificial insemination. All this is in an environment, that has, due to the number of livestock involved, veterinary, research and other support of all types, second to none in the world.

So far, I see almost no parallels between New Zealand and the heavy, poorly drained clay soils close to the sea, at Maha‘ulepu.

As stated, high producing dairy cows are very efficient at converting grass to milk. Much grass and many gallons of water are daily consumed at one end and waste in the form of manure and urine is ejected at the other. Twice a day many quarts of high quality milk are available at the cow’s udder.

To get grass into the cow’s three methods can be employed depending on the weather. (A) In fine weather the cows walk to and from the milking facility to the grass where it is processed through the cow.

(B) If there is a danger of causing too much mud the grass can be harvested with a forage harvester and brought to the cow’s. (C) A combination of both A and B.

All this grass consumed unfortunately also transfers fertility from the soil and means must be employed to return as much manure as possible to the fields.

Given the density of livestock on what is potentially a very muddy area during long wet spells I would presume there will be adequate concrete “hard standing areas” as well as this obvious requirement around the milking facility. As has been pointed out from many previous letters there will be a large accumulation of manure and urine. During (A) 80% will be deposited on each field. There will still need to be a method to collect and regularly spread the balance accumulated around the milking facility.

During (B) this operation becomes a major exercise. And (C) of course would be something in between. Any such intensive dairy operation requires rotational grazing – that is where the cows are moved on a daily basis from one field to the next to allow grass to recover and be ready for the next cycle. If cows are allowed to create too much mud while in the field during very wet weather in such poor draining clay soils, grass will be slower to recuperate. After each grazing the deposited manure must also be spread (by tractor and chain harrows) so that accumulated deposits are not too deep for grass to grow through or the grass will die.

Given the money available the initial proposed stocking rate should be feasible but as I have tried to explain above the area is far from ideal. Additional stocking rates will of course only exacerbate the problems.

As a permanent resident of Poipu adjacent to the Hyatt I have major concerns.

1. Those of us who have been brought up around livestock are used to animal smells. Those whose lifestyles subject them to perhaps only vehicle exhaust fumes at worst and the scents of flowers and trees at best, will most likely find any smells emanating from the farm highly objectionable. To say there will be no smells irrespective of wind direction, is delusional.

2. If the cow manure is not spread while fresh the smell becomes much more pronounced and certainly objectionable to even those with less acute olfactory senses.

3. In the twenty five years I have resided in the area we have experienced heavy periods of rain at times that would almost certainly, despite all precautions, cause discharge of unacceptable pollutants into the ocean.

4. Items 1, 2 and 3 will also certainly impact my property values and those of my neighbors as well as detrimentally affecting the tourist industry of the area which is of course one of the primary engines of Kauai’s economy.

David Collison
Poipu
Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

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The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, including storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā’ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.
The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximize grass as the cows’ primary nutrition source and minimize stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivot can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance, “farm” is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhūʻulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kauaʻi to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhūʻulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai’i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as BST or rBGH.

SOILS: Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during drier periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yoet and Nicholas Krueger of the University of Hawai’i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershedscale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua’i Soil & Water Conservation District in December, 2013.
The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a "Custom Soil Resource Report for Island of Kaua'i, Hawai'i." The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Ka'Ani Clay at 32 percent, Kaluhi Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as "poorly drained", and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas “drainage” refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrate and nitrates to gaseous forms, which reduces the potential for impacts on waterbodies. In this way, "poorly drained" soils may represent less risk of nitrate and nitrite leading to associated waterbodies than "well drained" soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soils at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai'i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy's focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbon in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

NATURAL HAZARDS: The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards. The Māhā'ulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai'i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone. The Kaua'i and Ni'ihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands.

Although they occur infrequently, Kaua'i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhā'ulepū region during and following the hurricanes that affected Kaua'i in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhā'ulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua'i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural
Sciences, and Cornell University Cooperative Extension. The plan includes safety
approximately $8,000 for improvements related to expansion for the contemplated

The HDF project would create short-term benefits through jobs for local
construction period. Thus direct-plus-indirect employment association
construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction
employment would be expected to average about 12 jobs per year during the
development period. In total, direct-indirect employment related to Dairy construction
would be expected to average approximately 36 jobs, of which 28
would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is
heavily based on the visitor industry. With only two dairies remaining in the State
(both on the Hawaii Island), approximately 10 percent of Hawaii’s milk is locally
supplied. The HDF project, with an established herd of up to 699 mature dairy cows,
will increase the supply of local fluid milk by approximately 1.2 million gallons of
milk annually, a 50 percent increase in statewide milk production. On-going dairy
operations at the committed herd size will provide approximately 16 direct and
indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11
indirect jobs. An additional 6 indirect jobs related to on-going dairy operations
would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County
when the 699 cow herd is established. When the dairy has matured to full
production for the 699 cow dairy, net income to the State is calculated at $160,000
annually. With the potential contemplated herd size of up to 2,000 mature dairy
cows, approximately 4.4 million gallons (36,719,780 pounds) of milk
would be produced. This would double local milk production currently supplied by operational
dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the
contemplated 2,000 mature dairy cow herd is estimated at approximately 3
construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a
total increase of 9 jobs. For on-going operations at the contemplated herd size, an
additional 5 full-time farm jobs would be added, with approximately 15 additional
indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of

ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could
attain the objectives of the action’s purpose and need, and were compared with
environmental benefits, costs, and risks of each reasonable alternative against those
of the proposed dairy project. Further discussion of alternatives can be found in
DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s
purpose and need, and compares environmental benefits, costs, and risks of each
reasonable alternative against those of the proposed action. Additionally,
reasonable land use alternatives that emerged from public input during the project
scoping phase are documented and briefly discussed. The alternatives that do not
meet the project purpose are not advanced for analysis of environmental benefits,
costs, and risks. The Environmental Impact Statement Rules, Hawaii Administrative
Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could
attain the objectives of the action, regardless of cost. There is no requirement for the
alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed.
Rezoning the land for resort or residential development, or a potential conservation
condemnation are two uses that were examined and eliminated from analysis.
These options would not be reasonably viable given the existing private land tenure
and existing zoning. Two additional alternatives were considered as reasonable
land uses as they could be permitted within the existing State Land Use Agricultural
District and County Agricultural Zoning District. These options include Agricultural
Park with Processing Center, and development of an Agricultural Subdivision. The
alternatives were examined and eliminated from further analysis, however, as they
would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose.
Rigorous exploration and evaluation of the environmental impacts of the
alternatives, including those that might enhance environmental quality or avoid,
reduce or minimize some or all of the adverse environmental effects, costs and risks.
These alternatives include: (1) the development of a Conventional Feedlot Dairy (a
non-pasture-based dairy) at the same location; (2) development of the Pasture-
Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing
by HDF. The alternative of “No Action” is also evaluated.
The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai’i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua’i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3).
- However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai’i Dairy Farms was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai’i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai’i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua’i, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities.
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaii Dairy Farms”:

http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AKP, LEED AP
Principal Planner
We are members of the Friends of Maha‘ulepu (FOM) and my comments herein should be viewed as additional to those forwarded to you from the Law Offices of Charles M. Tebbutt, P.C., on behalf of FOM, dated February 23, 2015.

The Proposed Dairy Would Contaminate Surface and Ground Waters, Detrimentally Impacting the nearby Coastal and Marine Environments and Ecosystems

My comments will focus on the highly probable negative impacts of nutrients derived from the dairy cattle that Hawai‘i Dairy Farms (HDF) propose to maintain in the Maha‘ulepu watershed on the plants and animals of the intertidal and nearshore marine waters and seabed that will receive freshwater runoff from the proposed dairy farm site.

I have read the Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice. The EIS Preparation Notice makes no mention of planned analyses of how manure/urine contaminated

(a) fresh surface water will impact the coastline or the nearshore coastal marine environment near and down current of the point at which Waiohuli Stream discharges into the sea near Gillin’s Cottage, or

(b) groundwater which may flow or leach into the Maha‘ulepu seafloor over a broader area.

The EIS must fully address these highly probable impacts, including a careful examination of the effects of each manure and urine component on the shoreline and nearshore marine environments.

The scientific literature includes many published studies of the impacts of land-based nutrients on shoreline and nearshore marine life — both plant and animal. Of particular concern in the Maha‘ulepu area are the corals which are already under increased stress from ocean warming and acidification and well known to be highly susceptible to being killed by certain marine algae which thrive when land-based nutrients are made available. When the corals are killed, the whole ecosystem is radically changed.

Tropical seas, like that off the Maha‘ulepu shoreline, are generally very nutrient poor and the associations of plants and animals that have evolved there are very efficient at recycling the available nutrients. However, they are severely and negatively impacted when unusual concentrations of nutrients become available.

Thus, the EIS must identify (a) the full range of possible impacts of manure/urine on the shoreline and nearshore marine plant and animal communities, (b) ways to prevent these impacts, and (c) responses which will be made should the prevention approaches not be effective.

Michael Coon, M. Sc.
May 26, 2016

Michael M. Coon
548 Beach Drive
Victoria, BC Canada V8S 2M5
michaelandjenica@gmail.com

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā'ulepū Road
Kaua'i, Hawai'i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Michael M. Coon:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699 cows, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**FLORA AND FAUNA:** Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under either Federal or the State of Hawai'i's endangered species programs in or near the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing plant species. The survey also investigated the presence of plants currently listed as endangered, threatened or proposed for listing under Federal or the State of Hawai'i's endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plant species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhā'ulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kaua'i may overfly the site. The endangered Hawaiian goose, nēnē was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kūkōa area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal biological impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include limiting flight times during critical periods, limiting nighttime lighting, and shading any outside lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.
GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Wainee volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprólite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 18.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and shallow groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DRED&T) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2030, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalaha‘e districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waipili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.
Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand barriers in swales; and geotextile fabric and sediment logs around drain inlets.

Surface Water Quality: The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makuawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data; however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwp).

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HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Graz yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.
Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiohili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kauai community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaii Dairy Farms”: http://tinyurl.com/OEQCfKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Felicia Cowden:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, rotational-grazing dairy farm in Māhāulēpū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāulēpū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways...
manages and cow races are designed to provide a comfortable path under hoof. The practices and pasture model applied by HDF maximizes grass as the cows' primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. The majority of the pastures will be irrigated with non-potable water and/or diluted effluent. Pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm. The irrigation water supply is provided to the farm from Waianae Reservoir, and will be managed through the Department of Agriculture. The water is filtered and pumped to the various irrigation components, depending on the actual irrigation needs of the farm.

The animals will be transitioned to pasture at HDF units of feet per day. It is a measure of how easily water will move within the unit of soil. The alluvial material is highly weathered lava and is comprised of dark brown to black clay and claysil.

GROUNDED WATER

The groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and utilized as a resource. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanic material. The alluvial material is typically composed of silt and clay in the valley floor, and is composed of sedimentary rock in the valley. The alluvial material is generally extensive about 60 feet under the surface and is underlain by a water table. The alluvial material is generally clayey silt and organic matter. The alluvial material is generally composed of silt and clay in the valley floor, and is composed of sedimentary rock in the valley. The alluvial material is generally clayey silt and organic matter. The alluvial material is generally composed of silt and clay in the valley floor, and is composed of sedimentary rock in the valley. The alluvial material is generally clayey silt and organic matter.

The GWB-1 unconfined aquifer consists of unsorted silts and clays with moderate hydraulic conductivity. The GWB-2 confined aquifer consists of sand and gravel with high hydraulic conductivity.
and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po’ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two water bodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (mgd), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (90.85 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water.

Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po’ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po’ipū - Kalahē districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water:**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hū‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waipōlai Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

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To provide perspective, nutrient inputs from the adjacent Kūloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 14 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.
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AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylot” of confined dairy operations where animals walk over dirt and dried manure throughout the day. Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual odors impact likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawai'i Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

[Signature]

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

February 23, 2015

Group 70 International, Inc., 925 Bethel Street, 8th Floor, Honolulu, HI 96813

RE: Hawai'i Dairy Farms, Paipu, Kauai:

(4) 2-9-003:001 (portion); 006 (portion) (4) 2-9-001:001 (portion)

Aloha,

I am and have been a full time resident of Kauai for 27 years. I raised my three children in Poipu. I have conducted my business as a Licensed Realtor in Poipu for 27 years. I own a home and a legal vacation rental condo in Poipu. I am gravely concerned that allowing the proposed dairy to occupy and operate at the proposed site will be financially and physically devastating to me, my community, my island and my State. I do not believe that cow's milk is a necessary part of a healthy diet. For the following reasons, I implore you to vote against any permits being approved that would make it possible for this venture to go forward in this location or anywhere along the South Shore of Kauai:

CONCERN:

Involves an irrevocable commitment to loss or destruction of any natural or cultural resource;

CATALYST the range of beneficial uses of the environment (for plants, animals, or humans);

Subsequently affects a rare, threatened, or endangered species, or its habitat, and Detrimentally affects air or water quality or ambient noise levels;

- I was married on the beach at Mala'ekapu'u and know of countless others who have enjoyed weddings and monumental events, family gatherings, fishing (a huge part of the local culture), hiking, swimming, surfing or horseback riding along the pristine coastline at Mala'ekapu'u. The air is fresh. There are very few (if any) fires. The water is clean and the sea life prolific. Monk Seals bring their new born babies to rest and bask in the sun on the protected white sand beaches. Sheepwolves and Turtles nest in the area. The smell of the dairy alone will make it unbearable for humans forever go to Mala'ekapu'u to enjoy its natural and cultural resources. Endangered species as well as humans and plants will be further endangered by the dust of runoff from the dairy polluting the coastal waters with cow excrement. Lights at the facility could endanger our "protected" shearwaters.

CONCERN:

Subsequently affects the economic or social welfare of the community or State;

Involves substantial secondary impacts, such as population changes or effects on public facilities;

Involves a substantial degradation of environmental quality;

- As a Realtor, I have clients (home owners and vacation rental property owners) who have told me that they will ABSOLUTELY sell their property and move out of Poipu (and possibly the State) if the proposed dairy moves forward with their plans to operate at Mala'ekapu'u. One 2nd home owner told me that a dairy (of less than 2000 cows) moved into her hometown and can be smelled 36 miles from the source. Poipu... right now has a three year supply (based on absorption rates) of properties on the market for sale. Many of these Sellers have stated that they are selling because of the proposed dairy. Many are selling at a loss. It doesn't take a rocket scientist to realize that lower property values will effect Property Tax Revenues to the State. It is likely to cause a loss of jobs in the hospitality industry across the board, and a reduction in the TAT Revenues as guests catch wind of the stench of manure and share their concerns on Trip Advisor and other social networks. This could bring another rash of foreclosures when folks can't afford to pay their HOA fees due to loss of rental income. Realtors will suffer loss of income which will reduce GET Tax Revenues to the State.

SOLUTION: PERHAPS find another location for the dairy to move forward without severely impacting our local wildlife, forest residents, local businesses, local taxes and local lifestyle!!!!

Mahalo,

Brenda Crawford • 2990 Puu Alanui Pl • Koloa, HI 96756 • 808.651.6234

Cc:

State of Hawaii, Department of Health, 1250 Punchbowl Street, Honolulu, HI 96813

Jeff Overton Hawaii Dairy Farms, LLC, P.O. Box 1690, Koloa, HI 96755-1690
May 26, 2016

Brenda S. Crawford
2990 Pua Alani Place
Koloa, HI 96756
BrendaSueCrawford@gmail.com

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhāulepū Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Brenda S. Crawford:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be utilized to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

ARCHAEOLOGICAL AND CULTURAL: The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-294. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. AIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising, given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic-era cultural materials associated with the many Land Commission Awards in the project area were nonexistent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhāulepū Ahupua‘a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

FLORA AND FAUNA: Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened or proposed for listing under Federal or the State of Hawai‘i’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its

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present and historical uses for intensive agriculture very much limit the natural
broad-based practices. The project will include vegetated buffers along the
in the portion of the Conservation Plan to reduce erosion and stabilize
flies are identified on the HDF site using manure from neighboring livestock
were identified on the HDF site using manure from neighboring livestock as
and those associated with dairy
avoid potential fly breeding habitat in manure is the dung beetle, which buries
beetle, which buries manure and incorporates it into the soil. Populations of
dung beetles are specialists in the very important natural process of
inadvertently be brought to the dairy and utilize manure as a food source. HDF
will prevent and control fly population growth through diligent clean up and
in order to control those species. No federally or state listed endangered or
are common in areas with high pet populations. It is possible these fly species
could inadvertently be brought to the dairy and utilize manure as a food source. HDF
will prevent and control fly population growth through diligent clean up and

Avian and mammalian surveys were conducted in August 2014 by Rana Biological
Consulting, Inc. This survey was conducted to assess the potential presence of avian
or mammalian species currently listed as endangered, threatened or proposed for
listing under either Federal or the State endangered species lists. The survey
covered the dairy site area and immediate vicinity. Common birds and terrestrial
mammals were encountered on the property. There is no critical habitat for
endangered species in the upper Māhā'ulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby
taro farm located within the HDF site. Though the area does not provide critical
habitat, seabirds that nest in upland areas of Kauai may overfly the site. The
endangered Hawaiian goose, nēnē was also recorded on the site. State Division of
Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject
property. It is probable that some nest on or adjacent to the site as this species nests
in the general Kīōna area, and the habitat present on parts of the site is suitable for
nēnē nesting.

The principal potential impacts posed to the five endangered species include those
potentially associated with construction activities, and those associated with dairy
farm operations following build-out. Measures will be adopted to avoid potential
seabird and nēnē goose collisions with fences and structures. Potential measures
include lowering construction cranes at night, using conservation fencing to project
specified areas, marking tall structures and fencing with white visibility polytype,
limiting nighttime lighting, and shading any outside lights used at night. Ongoing
mitigation strategies will be implemented for day-to-day preventative measures,
including an Avian Species Protection Plan. Mitigation measures are further
described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis.
While caution will be taken during any potential disturbance or vegetation removal,
there are almost no suitable roost trees within the dairy site, thus it is expected that
the dairy farm will not affect this listed mammal species.

**PESTS:** A study of invertebrate species and pest insects was conducted by Steven
Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes
the presence or absence of native species or pest species associated with cattle
manure in the general Māhā'ulepū area, as well as the pests and predators that
control those species. No federally or state listed endangered or threatened
invertebrate species were noted in the survey of the site. A full report and list of
species found on site is provided in EIS Section 4.11 and Appendix R.
The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 12 jobs on Kaua‘i, and 9 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36719.780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:**

Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali series are typically 10 to 20 feet below sea level. Weathered lava in the area is typically Saprolite, brown to black silty clay and clayey silt.

The groundwater and surface water analysis for this Draft EIS examined whether the shallow groundwater in the alluvial material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk...
Rules require that potable water be used for milk production, both in the milking parlor and for milk processing; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōkōa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōkōa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōkōa-Poʻipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōkōa - Poʻipū - Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

Water Hydrologic Unit is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hāʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōkōa - Poʻipū - Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CBW to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent waterways. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CBW noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).
Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, US. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35 feet from the top of drainageway (totaling 70 feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 659 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūleʻpū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totalling 10,000 pounds per year), and one percent of phosphorus (totalling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release; rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.
air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

**DUST**

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "dryline" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive-dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may extend to the pastures approximately 1,670 feet (within one-third of a mile) beyond the HDF boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analyses were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OIEC website at the following URL: search "Hawaii Dairy Farms". [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Re: Notice of Preparation of DEIS for HDF at Maha'ulepu, Kaua‘i

Aloha Ms. McIntyre and Mr. Overton,

I request that the DEIS explain why Maha‘ulepu, the most treasured of all places in the entire state of Hawaii, was chosen as the place for a dairy.

Maha‘ulepu was held in highest regard by Congresswoman Patsy Mink, who upon seeing it for the first time, exclaimed that it should be designated as a National Monument. She sent cards with pictures of Maha‘ulepu to each member of congress encouraging them to support the idea.

Governor Cayetano referred to Maha‘ulepu as the crown jewel of the state of Hawaii.

Senator Brian Schatz is working toward a permanent means of protecting Maha‘ulepu through the National Parks system.

Thousands of people have signed their names to a record of support to preserve Maha‘ulepu in its natural state.

Maha‘ulepu can sustain the right kind of agriculture, but a dairy farm with its potential impacts of irreversible harm is clearly not the right kind of agriculture.

So, the question is why Maha‘ulepu? Why this magnificent environmental treasure?

Respectfully,

Judy Dalton
4330 Kauai Beach Drive
Lihue, HI 96766
808-246-9067
costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center; and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Carol Ann Davis-Briant:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will continue to evaluate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as a natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways, and pastures minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways...
and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows' primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waitea Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.5, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

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The number of pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waitea Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

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capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua‘i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

INVERTEBRATE SPECIES: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā‘ulepū area, as well as the parasites and predators on site that control these species. Fieldwork was conducted during September 15-16, 2014. The entire study is included in Draft Environmental Impact Statement (EIS) as Appendix B.

CAVE AND LAVA TUBE INVERTEBRATES

There are no known caves or lava tubes found at or adjacent to the dairy farm property. The Kīlauea Lava Tube System, which provides habitat for two endemic cave species, the Kaua‘i Cave Wolf Spider and the Kaua‘i Cave amphipod, is located several miles away from the dairy farm property. Both invertebrates are listed as endangered under the U.S. Endangered Species Act. Not all caves in the Kīlauea area contain these invertebrates, as many do not contain the optimal climatological conditions required by these organisms. Neither the botanical and faunal survey nor the invertebrate survey revealed any evidence of lava tubes or caves on the property, and no such features have been reported for the area near the Hawai‘i Dairy Farms (HDF) site. Thus no cave invertebrate species will be affected by the dairy farm.

INTRODUCED PREDATOR INSECTS

An invertebrate study of manure-associated insects was conducted for the Draft EIS. The study included a field survey that used manure from an adjacent beef cattle herd as a lure, and determined flies and other manure-related insects currently present at the HDF site. Pest insects such as flies can negatively impact livestock health and production, and are therefore actively managed to prevent stress and loss of productivity at dairy operations.

At the HDF site, two common flies were identified: the stable fly and the horn fly. Both of these flies are widespread throughout the Hawaiian Islands. The greenbottle fly was reared from manure taken back to a laboratory following the field survey.

Additionally, flies known to exist on Kaua‘i but not seen at the HDF site during the survey were identified and include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations.

In response to cattle-related insect pests, numerous species known to compete with the pests were introduced to Hawai‘i between 1898 and 1982. Twenty species of predators and competitors to the horn fly were successfully established during that period. Cattle egrets break up dung patties while searching for prey, and were introduced to Hawai‘i in the late 1950s to control cattle-associated insects. Extensive introduction of dung beetle species resulted in 14 dung beetle species becoming established on Kaua‘i.

A healthy population of dung beetles can bury a dung pat in one to three days, which disrupts reproduction of flies such as the stable fly and horn fly. The stable fly requires approximately 21 days within the dung patty for the immature life stage (egg to pupa) to survive; the horn fly takes 10 to 20 days from egg to adult. Incorporation of the manure into the soil profile by dung beetles removes the habitat these flies require to complete their lifecycle. Research shows that 95 percent fewer horn flies emerged from dung patties containing a dung beetle species that has been identified at the HDF site. Proven control methods for the stable fly include parasitic micro-wasps and spreading out manure.

Among the invertebrates previously introduced to Hawai‘i to combat livestock-related flies are extremely tiny parasitic wasps that prey on various fly species. The adult wasps could be described as the size of gnats. Using an ovipositor – described by lay people as a “stinger” – the female lays eggs in the larvae or pupa of flies. The male wasp has no such “stinger”. See Draft EIS Section 4.11 for a photo providing scale for these tiny, non-stinging wasps.

To minimize potential establishment of pest flies or other insects, food waste generated during the construction phase will be bagged, covered, contained and disposed of in order to limit possible breeding habitat for flies. Inspections of building materials for ants or other insects will be conducted to prevent introduction of new pests to the HDF site. Short-term controls, including mechanical methods (e.g. sticky tapes or ribbons in the milking parlor, or traps with or without attractants) and chemical methods may be used to prevent short-term spikes in pest populations.

Insecticides and herbicides are non-discriminatory and kill beneficial as well as pest insects. Beneficial insects include primary decomposers such as earthworms and dung beetles, and pollinators including bees. Should chemical control be needed for short-term spikes in pest populations, application would be by those qualified, and in accordance with regulatory labeling requirements. HDF will implement long-term integrated pest management, which utilizes knowledge of the ancient food web among species by disrupting the manure habitat required to complete the fly life cycle. HDF and other ranchers on Kaua‘i may choose to engage with the State Department of Agriculture to translocation dung beetle species already introduced on Kaua‘i to Māhā‘ulepū and other areas where manure-related flies may be a problem.
beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Mā‘ili Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pats in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōla-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ala Kinoiki Road between Kōla and Po‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized control to reduce pest populations need to address breeding sites in and amongst the food and animal wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

DEMOGRAPHIC AND ECONOMIC

The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i. Indirect full-time employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. Ongoing dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to ongoing dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horse fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila mauphila, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation kō‘ō‘a forests.

By populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung
annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double the milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimānalo volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor; and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 105 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day.

Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Possible Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water
Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, Kauai Department of Water. Within this setback, no effluent will be applied to groundwaters in the volcanic, lower layer, which is the source of potable water, or irrigated pastures. No changes are anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation and the 4,500-foot distance between the Makahapa'alu well and the dairy facilities indicate no adverse impacts to ongoing use of groundwater in the volcanic, lower layer. The Kauai F well will result in no adverse impacts to ongoing use of groundwater in the volcanic, lower layer. The Kauai F well will result in no adverse impacts to ongoing use of groundwater in the volcanic, lower layer.

The assessment concludes that the modest potable water demand from the dairy operation and the 4,500-foot distance between the Makahapa'alu well and the dairy facilities indicate no adverse impacts to ongoing use of groundwater in the volcanic, lower layer. The Kauai F well will result in no adverse impacts to ongoing use of groundwater in the volcanic, lower layer. The Kauai F well will result in no adverse impacts to ongoing use of groundwater in the volcanic, lower layer.
Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalāhea districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waipōlīli Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built infrastructure within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waipōlīli Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waipōlīli Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waipōlīli Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sample within the Waipōlīli Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waipōlīli Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator bacteria levels. CWB noted that Waipōlīli Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulate matter during stormwater events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in deficit and require commercial supplementation. Grass yields are anticipated to
increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā`ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kūloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 35 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 14 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict as, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cattle move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylot" where confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the
background concentration of particulate matter (both PM$_{10}$ and PM$_{2.5}$) measured on the island of Kauai), and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM$_{10}$ is 2.01 μg/m$^3$, well below the State standard of 150 μg/m$^3$. The estimated concentration for PM$_{2.5}$ is 0.23 μg/m$^3$, well below the Federal standard of 35 μg/m$^3$ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawai`i Dairy Farms”:

http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
From: 8086358777@mms.att.net
Sent: Wednesday, January 28, 2015 7:30 PM
To: EPC, lpdecker@gmail.com

Dear Sirs,

Re: Hawaii Dairy Farms

At that February 2014 informational meeting held at the Koloa Kauai neighborhood center, Hawaii Dairy Farms representative Amy Hennessey told us their proposed dairy for Maha‘ulepu Valley is modeled after the grass-fed dairies in New Zealand.

Many of New Zealand’s streams and rivers are contaminated by the dairy cow urine-manure run off during extreme weather events (heavy rainfall over extended periods) resulting in the poisoning of marine life. Those contaminated rivers and streams flow to the ocean.

New Zealand has closed beautiful beaches and posted health warning signs because the sand is now “impregnated” with dairy cow manure washed up onto their shoreline.

New Zealand was once a beautiful pristine island like Kauai. Kauai, like New Zealand, has extreme weather events (heavy rainfall over extended periods) annually. Therefore Hawaii Dairy Farms should not be permitted to operate a dairy of any size in Maha‘ulepu Valley because of location’s close proximity to certain south Kauai streams, ocean and beaches.

Hawaii Dairy Farms should be encouraged to submit a different site for their proposed dairy, away from all Kauai’s rivers, streams, ocean and beaches, in order to produce milk for Hawaii families.

We Kauai families cherish our pristine beaches and clean ocean, and we all have a duty to protect Kauai’s streams, ocean and beaches for Hawaii families.

A dairy operation is not a prudent agricultural proposal for the South Kauai coastal area. Hawaii Dairy Farms recently revised dairy operation proposal continues to lack sound judgement, reasoning and stewardship of Maha‘ulepu Valley.

Sincerely,
Lori Decker
2659 Puuholo Road
Koloa HI 96756

Coastline Cottages
2660 Puuholo Road
Koloa HI 96756

February 23, 2015
Laura McIntyre
State of Hawaii Dept of Health
1250 Punchbowl Street
Honolulu HI 96813

Group 70 International
925 Bethel Street 38th Floor
Honolulu HI 96813

Jeff Overton
Hawaii Dairy Farms
PO Box 1690
Koloa HI 96756

Dear Ms McIntyre,

We have been assisting Kauai visitors from all over the world with Poipu accommodations for eighteen years. We have seen economic downturns as a result of the World Trade Center terrorism, massive construction in East Poipu, and the 2008 global financial meltdown. The Poipu visitor industry always recovered due to Poipu’s pristine beauty, beautiful clean beaches and ocean, and its unique culture and heritage.

A proposed dairy of any size in Maha‘ulepu Valley will cause a certain and permanent economic disaster for the Poipu visitor industry. Word will quickly spread on social media not to go to Poipu – it stinks. Why would visitors come to Poipu? There are many other beautiful places to relax by a pool or on a beach that don’t stink or have flies.

There will be certain noise pollution from dairy cows and calves during Poipu’s quiet nights. There will be certain noise and light pollution from the proposed milking parlor during Poipu’s dark nights and early mornings.

Please accept this letter as our written request that air pollution, noise pollution, light pollution, water pollution, water usage, and economic harm to local Poipu businesses and workers caused by an industrial dairy in nearby Maha‘ulepu Valley all need to be addressed and answered by the EIS.

Sincerely,
Lori Decker
President
Dear Ms McIntyre,

Our corporation was formed in Hawaii in 1980 for the purpose of owning Kauai real estate. The corporation currently owns a vacation rental home in the Poipu Kai Resort near the Grand Hyatt Kauai. That vacation rental home is designed for natural cooling. The cool trade winds blow through the home 80% of the year.

The air quality problems caused by gases emitted from the decomposition of dairy cow wastes and by the dust generated by animal activity and farming practices are well documented. We know these air pollutants can cause respiratory illness, lung inflammation and increase vulnerability to respiratory diseases like asthma.

Please accept this letter as our written request for you to ensure 1) the certain air pollution produced by the proposed dairy located directly upwind of our residential neighborhood, and 2) the certain economic harm to the existing Poipu property owners caused by the proposed for-profit industrial dairy located directly upwind of our residential neighborhood, be addressed and answered by the EIS.

Specifically the EIS should address the direct public health and economic harm from a 150, 300, 699 and 2000 dairy cow operation. Also, the EIS should address the distance aerosolized manure and urine will travel with Kauai trade winds when effluent is spread through overhead irrigation.

Sincerely,

Lori Decker
President

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May 26, 2016

Lori Decker
2659 Paaholo Road
Koloa, HI 96756
ipdecker@gmail.com

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhū‘elepō Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001: 001 portion

Dear Lori Decker:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhū‘elepō Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 21, 2015, described the proposed pasture-based rotational grazing system.
as a "zero-discharge, grass-fed dairy". The term "zero-discharge" under the U.S. Agricultural (USDA) Marketing Survey created a narrow legal definition of "grass-fed", the term in not used in this EIS. Under the U.S. Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.1. Agriculture infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management. The pastoral rotational-grazing dairy provides a local feedstock – grass – as the source, method of application, and timing of plant nutrient and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance and the desirable use of the waste, reflected in the livestock waste guidance found in Draft EIS Section 3.3.1.

Agricultural producers, organic food, human food, organic meat, and vegetable production, from the seed to the table, are discussed in Draft EIS Section 3.4, Ag-Business. According to the Food and Drug Administration, the term "organic" describes foods that come from animals supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.1. Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management. The pastoral rotational-grazing dairy provides a local feedstock – grass – as the source, method of application, and timing of plant nutrient and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance and the desirable use of the waste, reflected in the livestock waste guidance, see Draft EIS Section 3.3.1.

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Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

INTRODUCED PREDATOR INSECTS

Insecticides and herbicides are non-discriminatory and kill beneficial as well as pest insects. Beneficial insects include primary decomposers such as earthworms and dung beetles, and pollinators including bees. Should chemical control be needed for short-term spikes in pest populations, application would be by those qualified, and in accordance with regulatory labeling requirements. HDF will implement long-term integrated pest management, which utilizes knowledge of the ancient food web among species by disrupting the manure habitat required to complete the fly life cycle.

At the HDF site, two common flies were identified: the stable fly and the horn fly. Both of these flies are widespread throughout the Hawaiian Islands. The greenbottle fly was reared from manure taken back to a laboratory following the field survey. Additionally, flies known to exist on Kaua‘i but not seen at the HDF site during the survey were identified and include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations.

In response to cattle-related insect pests, numerous species known to compete with predators and competitors to the horn fly were successfully established during that period. Cattle egrets break up dung patties while searching for prey, and were introduced to Hawai‘i in the late 1950s to control cattle-associated insects. Extensive introduction of dung beetle species resulted in 14 dung beetle species becoming established on Kaua‘i.

A healthy population of dung beetles can bury a dung pat in one to three days, which disrupts reproduction of flies such as the stable fly and horn fly. The stable fly requires approximately 21 days within the dung patty for the immature life stage (egg to pupa) to survive; the horn fly takes 10 to 20 days from egg to adult. Incorporation of the manure into the soil profile by dung beetles removes the habitat these flies require to complete their lifecycle. Research shows that 95 percent fewer horn flies emerged from dung patties containing a dung beetle species that has been identified at the HDF site. Proven control methods for the stable fly include parasitic micro-wasps and spreading out manure.

Among the invertebrates previously introduced to Hawai‘i to combat livestock-related flies are extremely tiny parasitic wasps that prey on various fly species. The adult wasps could be described as the size of gnats. Using an ovipositor—described by laypeople as a “stinger”—the female lays eggs in the larva or pupa of flies. The male wasp has no such “stinger.” See Draft EIS Section 4.11 for a photo providing scale for these tiny, non-stinging wasps.

To minimize potential establishment of pest flies or other insects, food waste generated during the construction phase will be bagged, covered, contained and disposed of in order to limit possible breeding habitat for flies. Inspections of building materials for ants or other insects will be conducted by these organisms. Prior to the introduction of new pests to the HDF site. Short-term controls, including mechanical methods (e.g. sticky tapes or ribbons in the milking parlor, or traps with or without attractants) and chemical methods may be used to prevent short-term spikes in pest populations.

INVERTEBRATE SPECIES

A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā‘ulepū area, as well as the parasites and predators on site that control those species. Fieldwork was conducted during September 15-16, 2014. The entire study is included in Draft Environmental Impact Statement (EIS) as Appendix B.

CAVE AND LAVA TUBE INVERTEBRATES

There are no known caves or lava tubes found at or adjacent to the dairy farm property. The Kīloa Lava Tube System, which provides habitat for two endemic cave species, the Kaua‘i Cave Wolf Spider and the Kaua‘i Cave amphipod, is located several miles away from the dairy farm property. Both invertebrates are listed as endangered under the U.S. Endangered Species Act. Not all caves in the Kīloa area contain these invertebrates, as many do not contain the optimal climatological conditions required by these invertebrates. The biological and botanical survey nor the invertebrate survey revealed any evidence of lava tubes or caves on the property, and no such features have been reported for the area near the Hawai‘i Dairy Farms (HDF) site. Thus no cave invertebrate species will be affected by the dairy farm.
Department of Agriculture to translocate dung beetle species already introduced on Kauai to Māhāʻulepū and other areas where manure-related flies may be a problem.

**IMPACT OF SPRAYS ON BEES**

Beneficial insects include primary decomposers such as earthworms and dung beetles, and pollinators including bees. Honey bees are an essential part of any agricultural ecosystem, and were observed on site during the invertebrate species survey. Pesticides and herbicides can reduce populations of beneficial insects, which is why HDF will utilize an integrated pest management approach.

It is expected that honey bees will visit water sources set up for the HDF herd. preventative measures will be built into any open water source to prevent bees from being trapped, and HDF will contact local beekeepers for advice regarding any bees or bee colonies encountered on site. Safe application practices for any unavoidable herbicide or pesticide will be utilized in order to narrowly target the correct pest species without harming other insects and animals in the area. Anyone using herbicides or pesticides will be properly trained and informed, and if a honey bee colony location appears to be a danger to workers or cattle, or to be in danger itself, a local beekeeper will be contacted for advice and removal.

**NOISE:**

Existing noise conditions of the project site and the surrounding Māhāʻulepū valley area are evaluated in the Draft Environmental Impact Statement (EIS), along with anticipated short-term and long-term noise conditions associated with the dairy farm and planned mitigation actions. Draft EIS Section 4.12 addresses noise conditions.

Noise can be defined as unwanted sound, a sound that is considered loud or unpleasant, and/or sound that causes disturbance. Research related to noise and livestock focuses on noise levels and minimization of unexpected sounds that cause undue stress on cows. Noise stress results in loss of livestock productivity and thereby financial loss to farmers and ranchers. Little research exists on the sound levels from livestock.

Sound is measured in decibels (dB). The State of Hawaii’s Department of Health (DOH) rules use the A-weighting sound network (dBA) in the HAR §11-46, Community Noise Control. Sound through the air is similar to ripples on a pond of water. In open space without reflection, ripples spread uniformly in all directions and decrease in amplitude further from the source. In free field conditions such as outdoors, amplitude drops by half as distance doubles (OSHA, 2016). When sound passes close to absorbing ground cover such as grassland and fields, the "soft ground" absorbs extra sound as it passes. The Hawai’i Dairy Farms (HDF) site in Māhāʻulepū Valley is approximately 2 miles from the resort area, and 1.5 miles from the closest residential areas (on land zoned for agriculture). Typical noise currently generated near the HDF site includes truck ingress/egress along private farm roads, agricultural equipment, and cattle and sheep.

Constrution work at the project site will involve activities that may generate an increase in noise levels. However, such exposures will be a short-term condition, occurring during daylight hours. Construction vehicles and activities must comply with DOH Administrative Rules. DOH noise control regulation requires a permit for construction activities that emit noise in excess of 78 decibels or that cause a total of more than $200,000. Mitigation measures to minimize construction noise will include the use of mufflers to suppress loud equipment and limitations on the hours of heavy equipment operation.

The dairy farm will utilize milking equipment contained in the milking parlor, and will use field equipment such as tractors. Under HAR §11-46, agriculture is classified as Zoning District Class C, which specifies maximum permissible sound levels of 70 dBA in the daytime and 70 dBA at nighttime. Dairy operations will generate noise in keeping with agricultural zoning of the parcel. The primary noise receptors in the area would be farmers working nearby parcels. Noise from the dairy will not exceed the DOH threshold, and will not contribute to excessive noise in the region.

**DEMOGRAPHIC AND ECONOMIC:**

The potential impacts of Hawai’i’s Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow herd, net income to the State is calculated at $160,000.
anually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 44 million gallons (367,197,800 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property values or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Wainana volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is overlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley and the HDF site ranges from 105 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water.
quality. Baseline data on water quality for both groundwater in the alluvium and
groundwater in the deep aquifer were documented. Future monitoring will allow
comparison between conditions prior to, and during HDF operations. Results from
the monitoring program will be shared with the Department of Health Clean Water
Branch, dairy neighbors and the local Kauai community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large
and increasing demand for potable water for community and resort development.
The State Department of Economic Development and Tourism (DBEDT) projects the
population of Kauai will increase county-wide by 17,300 residents by 2030. The
South Kauai population is estimated to reach 16,855 in 2035, when it is projected to
encompass 19.2 percent of the County population. For the South Kauai region (the
Kōloa - Po‘ipū - Kaliiheo districts), water use in 2035 is projected to be 324 MGD, an
increase of nearly 1 million gallons per day. An evaluation of the island’s
infrastructure capacity for projected growth in population (both residents and
visitors) through the year 2035 predicts the island will be facing a shortage of well
water. Water resources must therefore be carefully managed to accommodate the
projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water
Resource Management has established surface water hydrologic units for managing
surface water resources. The project area is located within the Māhā‘ulepū Surface
Water Hydrologic Unit, which features relatively high precipitation with relatively
low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is
fed by several intermittent streams coming off of the south slope of the Ha‘upu
Ridge. These normally dry streams converge into one or more channels running
to the west that originates at a small unnamed reservoir, and continues off site
towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure
will be constructed in a 10-acre area located along the site’s western boundary. Built
facilities within this area will total less than 2 percent of the HDF site. A Stormwater
Pollution Prevention Plan (SWPPP) has been developed as part of the application for
the National Pollutant Discharge Elimination System (NPDES) – Construction
Stormwater General Permit. Management controls will include: minimizing
exposure of disturbed surfaces; monitoring and repair of structural controls; and
prohibiting leaking or poorly-maintained construction equipment and machinery.
Structural controls to be utilized during construction will include: silt fence installed
in key locations; sand bags barriers in swales; and geotextile filter fabric and
sediment logs around drain inlets.

Surface Water Quality: The Kauai Chapter of the Surfrider Foundation began
collecting water samples in Waipōlī Ditch near the bridge accessing Makauwahi
Cave Reserve in April of 2014. The group reported high levels of enterococcus to the
State Department of Health (DOH) and provided its data, however, DOH was unable
to utilize the data as it did not meet Clean Water Branch (CWB) quality
assurance/quality control requirements, and it could not be used for regulatory
purposes. CWB had not conducted water quality sampling for either nearshore
recreation waters at the terminus of Waipōlī Ditch, or of surface waters in the
Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waipōlī Ditch
and concerns about the proposed dairy prompted CWB to conduct a “Sanitary
Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling
within the Waipōlī Ditch and areas upstream, and initiated a series of investigations
into water quality issues. Following EPA standards for a Sanitary Survey, DOH has
completed Part I of its report: Waipōlī Ditch Sanitary Survey, Kauai, Part I. The
Sanitary Survey found no significant impact to the ditch from any activity that
could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs
from existing agricultural operations may all be contributing factors in the indicator
levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along
the makai end of Waipōlī ditch blocks ultraviolet rays, which could help reduce
bacteria levels. CWB noted that Waipōlī Ditch is a man-made drainage on private
property, and is not an inviting recreational body of water utilized by people. The
Sanitary Survey can be accessed on the DOH Clean Water Branch website under

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching
activities are exempt from the Clean Water Act Section 404. HDF received
confirmation of exemption for maintenance of existing drainage ditches from the
Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional
practices are anticipated to fall under the exemption for construction or
maintenance of existing or new animal walkways, stream crossings, and farm roads
in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources
Conservation Service (NRCS). These practices include setbacks to reduce runoff that
could carry particles into surface waters. Fences will be erected 35-feet from the top
drainage ditches to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to
create filter strips that could capture particulates during stormwater runoff events.
Another setback restricts application of effluent within 50 feet of the drainageways;
only irrigation water will be used in these areas as needed to maintain the vegetated
buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The
natural fertilizer from manure deposited directly to pasture and effluent collected
from the milking parlor is insufficient to meet the agronomic need of the pasture
grass crop with the committed herd size of 699 mature dairy cows, and
supplemental commercial fertilizer will be required. Nutrients required to sustain
the 470 acres of pasture are the same for the future contemplated herd size of up to
2,000 mature dairy cows, though the proportion of nutrients supplied as natural
fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā'ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in water periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 18,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of years, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 35 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downstream from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipāpili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line. Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “dryspots” of confined dairy operations where animals walk over dirt and dried manure throughout the day. Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pasture rotational-grazing system will be on pasture 22 hours each day and will spend two hours — in two
separate milking cycles—moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM$_{10}$ and PM$_{2.5}$) measured on the island of Kaua'i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM$_{10}$ is 2.01 μg/m$^3$, well below the State standard of 150 μg/m$^3$. The estimated concentration for PM$_{2.5}$ is 0.23 μg/m$^3$, well below the Federal standard of 35 μg/m$^3$ (see Draft EIS Section 4.19 and Table 4.19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,700 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

**ALTERNATIVES:**

As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai'i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua'i; and (3) milk products processing by HDF. The alternative of "No Action" is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).
The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).

- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management, veterans and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.

- Sustainably food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts than the project proposed (Criterion 5).

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffers between highly utilized agricultural lands and sensitive natural or cultural resources (Criterion 6). This response letter accompanies your copy of the Draft Environmental Impact Statement (DEIS) available at the following URL, search "Hawai‘i Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
February 22, 2015

State of Hawai‘i
Department of Health
1250 Punchbowl Street
Honolulu, HI 96813

Group 70 International, Inc.
925 Bethel Street
5th Floor
Honolulu, HI 96813

Hawai‘i Dairy Farms, LLC
P.O. Box 1690
Koloa, HI 96756-1690

RE: RESPONSE TO PROPOSED ENVIRONMENTAL IMPACT STUDY
To Whom It May Concern:

As a resident of a home in the Po‘ipu area I am extremely concerned about the environmental impact that HDF proposed dairy in Mahale‘upu area will have on this pristine area. I feel it is imperative that I voice my strong objections to the proposed Hawaii Dairy Farm. As a travel professional I feel certain that the proposed HDF will profoundly and adversely affect tourism to Kauai. Should this happen many more jobs from the tourism industry will be lost compared to the very few created by the HDF.

The area of Mahale‘upu in question is the oldest geological area in the entire state of Hawaii. It is an archeological area of significant importance. For that reason alone it should be preserved. It has great cultural, spiritual and historic significance to the Hawaiian people and her culture, another reason for preservation of the area. This astoundingly beautiful area must be preserved.

The HDF dairy will undoubtedly affect the water quality of the stream that flows to the ocean. Pollution of the stream, land, watershed and ocean needs to be avoided at all cost! Gravity will pull the polluted water runoff toward the ocean and kill the reef which is essential to support our fisherman, scuba divers and snorkelers as well as the pristine Mahale‘upu beach. Loss of the coral reef is another example of the way we will lose tourists. When we lose tourism, we LOSE JOBS.

The EIS must include a study of the impact of HDF’s trucks and traffic in and out of the Po‘ipu area. HDF trucks will be hauling feed and fertilizer (as explained by HDF representative in the community meeting Feb 19). Trucks going in and out of the area will be carrying tanks full of milk as well as the empty trucks returning. Trucks will be going in/out of Po‘ipu area carrying all the chemicals needed to clean the stalls twice each day and insecticides necessary for the cows. A traffic study must be done as to our current traffic and the increased traffic HDF would impose on the area. Our roads will suffer under the added weights of their trucks. Will HDF repair our roads? Along with the trucks will be their noise and air pollution. Please address the important issue of truck traffic in/out of the area.

Milking stalls need to be thoroughly cleaned twice each day with harsh chemicals that will pollute the stream, watershed and run off into the ocean.

Air quality will be adversely affected by the trucks and the manure and anticipated collection ponds. With the manure will come the flies. Air and water will become polluted. I have been told the ponds will be lined with heavy plastic. There is no plastic on earth that will hold up to our hot, humid island conditions. What is the plan for overflow during our heavy rains and deterioration of the plastic pond liners?

Are we to believe that after the milk has gone to Oahu for pasteurization and bottling, it will return back to Kauai at an affordable price? If yes, the truck traffic would be increased even more. Have you seen the traffic problems that already exist on the island?
Dear Catherine DeMichiel:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**ARCHAEOLOGICAL AND CULTURAL** The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau,

Catherine DeMichiel
Travel Consultant
Island Palms to Pines Travel
and State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising, given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic-era cultural materials associated with the many land commission awards in the project area were non-existent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhāʻulepū Ahupuaʻa, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10% percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $164,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $80,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($75,000 total) versus $68,000 for the committed herd size. The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E.
and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area’s hydrology is shaped by its geology. The Koloa area was built by Napali formation lavas of the Wai‘anae volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically saprolite, a soft, thoroughly decomposed rock. The Māhā’ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Koloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā’ulepū Valley and the HDF site ranges from 18.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poʻipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā’ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable drinking water. The State Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā’ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā’ulepū 14 well and the County’s Koloa F well will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā’ulepū Valley, HDF established a 1,000-foot setback surrounding the Koloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa-Po‘ipū-Kīhei districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per week over evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā’ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā’ulepū watershed. The HDF site is located on the bottom-land of the upper Māhā’ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running...
Potential impacts from construction of the dairy facility and associated infrastructure (e.g. roads, irrigation ditches, etc.) will be evaluated in accordance with the State Department of Health’s (DOH) rules. A Sanitary Survey was conducted to assess the potential for contamination of the groundwater and surface water resources. The survey found that the groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water quality within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality and other nearshore matters. Following EPA standards for a Sanitary Survey, HDF utilized a comprehensive sampling strategy to collect water samples at strategic locations, including within and upstream of the ditch, as well as at various points along the valley. Samples were analyzed for a variety of parameters, including bacteria, nutrients, and other potential indicators of water quality.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from the Mahaliupali catchment would carry three to five times more nutrients than the current Waiopili Ditch stream. With the increase in agricultural activities, it is expected that additional nutrients will be introduced into the system, potentially affecting water quality and downstream ecosystems. The potential nutrient throughput from HDF is estimated to be approximately 38,510 pounds annually, of which approximately 55% is from domestic wastewater, 35% is from commercial fertilizer application, and 10% is from animal manure. Nutrients from commercial fertilizer application could result in excessive levels of nitrogen and phosphorus, which could lead to eutrophication and other water quality issues.

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and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipu region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment.** An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input to the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kauai community.

**TRAFFIC:** The Draft Environmental Impact Statement (EIS) Section 4.18 and 4.25 includes an evaluation of roadways and traffic conditions, along with potential impacts of the dairy farm construction and operation. Primary access to the site is via Māhāʻulepū Road, a two-way, two-lane road, which is accessible from Kōloa Road (Highway 530) via Ala Kinoiki Road. Within the project area, there is a network of unimproved private agricultural haul roads that provide access to and from Māhāʻulepū Road.

Roadways in the project area operate smoothly with no periods of heavy traffic. On average, traffic in the region is much lower than urban areas in the state due to the low population of Kauai and rural agricultural demographics of the south Kauai area and Māhāʻulepū. Traffic on Māhāʻulepū Road consists of agricultural vehicles, residential and resortvisitor traffic.

During construction, the proposed project is not expected to have a significant short term impact on traffic operations in the project vicinity. Additional traffic will be generated during construction, but will return to normal levels after project completion during day-to-day operations. There will be no change to traffic patterns or infrastructure related to the public roads.

Traffic operations along Māhāʻulepū Road and the surrounding County roads are expected to continue to operate at acceptable levels of service during peak hours of traffic. The projected increase in vehicle movements related to HDF operations for the committed herd size of 699 cows would include 5 daily employees accessing the site, milk tanker and supply trucks every two days, and truck with stock trailer for a total of 12 additional vehicle trips per day. Daily traffic along Ala Kinoiki Road and Kōloa Road was 8,000 and 6,500 cars daily; HDF-related traffic would add less than one percent additional trips. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area.

At a contemplated herd size of up to 2,000 cows, an additional 11 vehicle trips per day would access the HDF site, for a total of 23 vehicle trips daily. Projections for daily vehicle movements in 2035 for Ala Kinoiki Road and Kōloa Road are 7,200 and 9,500 daily vehicles. HDF-related traffic would add less than one percent. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area. Traffic data is presented in the Draft EIS Sections 4.18 and 4.24.

Construction equipment mobilization will comply with Hawai‘i Department of Transportation and County requirements. Delivery trucks and milk tanker trucks will be in compliance with State and County size and weight limits; no oversized vehicles will be used for ongoing operations.

**AIR QUALITY:** As part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure generation.
application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "dryslope" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours—in two separate milking cycles—moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₀ and PM₁₀) measured on the island of Kaua'i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₁₀ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19.1 and Table 4.19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy herds and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

ALTERNATIVES:

As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action's purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action's purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai'i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid,
reduce or minimize some or all of the adverse environmental effects, costs, and risks. These alternatives include: (1) the development of a commercially scale pasture-based dairy (Objective 1) in Hawai‘i Dairy Farms as a commercial scale pasture-based dairy operation in Hanalei, creating a new type of dairy farm, and (2) development of the Pasture-Operated Dairy at an Alternative Location on Kaua‘i, with the capability to produce milk/milk processing, and dairy business management (Criterion 2).

The alternative of “No Action” is also evaluated. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements, including pasture agronomy/soils science, environmental resources management, milk/milk processing and dairy business management (Criterion 2). According to the INTERA, the alternative of No Action violates the five criteria established for the project (Chapter 3, Section 2.3.3 and 2.3.4). This conclusion is based on the proposal’s failure to achieve the project objectives and meet each of the four Evaluation Criteria defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

1. Only one of the alternative actions (conventional feedlot alternative) would achieve 100 percent of the State’s fresh milk demand by utilizing 100 percent of State’s fresh milk demand, thus reducing 100 percent of dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported milk. (Criterion 1).

2. None of the alternatives would secure a dairy location that meets the criteria defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 3, Sections 2.3.3 and 2.3.4). In contrast to the other options considered, the proposed plume agricultural operation of Hawai‘i Dairy Farms was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

3. The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project. Creating an economically viable pasture-pasture-grazing model maintains the long-term economic viability of MilkFarmers, while ensuring the sustainability of the industry. However, after years of trying, it appears there was limited interest in such a venture.

In contrast to the other options considered, the proposed plume agricultural operation of Hawai‘i Dairy Farms was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

Thank you for your participation in the environmental review process.

Sincerely,

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
RE: RESPONSE TO PROPOSED ENVIRONMENTAL IMPACT STUDY

State of Hawaii
Department of Health
1250 Punchbowl Street
Honolulu, HI 96813

Group 70 International, Inc.
925 Bethel Street 5th Floor
Honolulu, HI 96813

Hawaii Dairy Farms, LLC
P O Box 1690
Kolaa, HI 96756-1690

To Whom It May Concern

I reside at 1831 Poipu Road, in Koloa. My home is located approximately 1-1/2 miles from the proposed Dairy Farm. The Dairy Farm will negatively impact my property value and my ability to enjoy the beautiful area I chose to retire to. I am sure what I have to share is not new but I felt compelled to put my thoughts on paper and send them to all concerned.

I am writing to voice my objections to the planned use of 578 acres of pristine land in the Maha'ulepu Valley for a very dangerous, unproven experiment. This project would violate every established criteria used in determining if a significant impact would result from the land's intended use. The shear contention that because the land is zoned agricultural does not automatically make it subject to being abused in the manner that Hawaii Dairy Farms intends.

The many newspaper articles have talked about the amounts of manure and urine, smells that this could create the potential for flies and the run off of contamination into streams and eventually the ocean. These arguments against the planned use of the property have been numerous and probably stated more eloquently than I can in this letter.

I wish to issue strong objections with a point that I feel is an absolute falsehood perpetrated on the public by Hawaii Dairy Farms: namely the Hawaii Dairy Farms justification for being, "Fresh milk for Kauai/Hawaii families". Not sure how this can happen since all potential milk will have to be shipped to Oahu with there being no pasteurization facilities on Kauai. Once this happens all raw milk loses its identity as to its original source thus making returning it back to Kauai somewhat problematic. In addition pasteurized milk definitely commands a significantly higher price from Asia making a return to Kauai even more questionable. Anyone who believes the Hawaii Dairy Farms statement as being a major intent for establishing a dairy on Kauai is a prime candidate to be sold resort property in the heart of the Great Disnial Swamp, which is what Maha'ulepu could be looked at within a short period of time should the dairy be approved.

The island of Kauai has other abundant suitable agricultural acreage upon which to establish a dairy should one be needed so badly. I can only scratch my head in wonderment why this acreage in Mala'alepu Valley, which possesses such a diverse historical, cultural, spiritual and environmental significance could have been chosen for an untested theoretical experiment that has never been proven to be a success anywhere in the world.

In summation, the dairy has not even been built yet but it has already provided a negative impact in the community through Hawaii Dairy Farm's attempt to strong arm their desire down the throat of the people it sought to appeal to. A terrible start to a terrible idea. This dairy must not be allowed to be built in Maha'alepu Valley.

Sincerely,

Robert P DeMichiel

February 22, 2015
Robert P. DeMichiel
1811 Poipu Road
Koloa, HI 96756

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i

Dear Robert P. DeMichiel:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pasture rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritional milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional pasture-specific trials at the Māhā‘ulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The
Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and the beef market in Hawaii with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as BST or rBGH.

ARCHAEOLOGICAL AND CULTURAL: The Hawaii Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic-era cultural materials associated with the many Land Commission Awards in the project area were nonexistent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.
The cultural assessment examined the potential effect of the project on cultural practices or beliefs, its potential to isolate cultural resources practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhu’ulepū Ahupua’a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

**DEMOGRAPHIC AND ECONOMIC** The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. Ongoing dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $680,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $80,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

Hydrology: The area’s hydrology is shaped by its geology. The ʻĪlima area was built by Napali formation lavas of the Waimanalo volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed muck. The Māhu‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the ʻĪlima series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic
groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium underlies Māhā‘ulepū Valley and the HDF site ranges from 185 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane production area. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Natural Resources. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and
State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaiser, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Library" (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce run-off, which could carry particles into surface waters. Fences will be erected 35 feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pastures collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 1.62 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter times more nutrients than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

To provide perspective, nutrient inputs from the adjacent Kīloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively dispenses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator...
Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kauai community.

**ALTERNATIVES:** As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action's purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action's purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai'i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kauai; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai'i, with the capability to produce 10 percent of the State's fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kauai in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai'i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai'i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai'i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area,
soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 6).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
As stated at the EIS presentation on Feb. 19th 2015, HDF plans to leave a large portion of excrement on the ground to fertilize the feed grass. This would be on clay soil, and would it eventually find its way to streams, the ocean, and also into near by wells. Two of these are the drinking water sources for the town of Koloa, and area of Lawai. HDF makes no mention of the proximity to the wells in their reports. This problem of contamination would certainly be heightened during a hurricane or even a big storm, such as Kauai residents refer to as "Forty Days and Forty Nights" that we experienced in the past. Even small storms could result in contamination.

Our wonderful world class environment is sure to be degraded by the addition of mega amounts of Methane gas, effluent run-off, and trampling cattle hooves. Also in need of consideration is the extremely rare Blind Cave Spider, one that has developed without eyes, and lives only in a cave on the Mahaulepu coast line. This extremely rare creature is currently being studied by scientists. Disturbing its ecosystem and the special conditions that it needs to thrive, would result in a huge loss to all of Kauai. Fresh and coastal waters that we have respected need to be kept in good condition and out of harm's way.

Our already over burdened roadways will surely be impacted by tanker trucks carrying milk for export from of Kauai. No plan to handle this in the HDF report. It seems that off island business owners are not really concerned with how their business impact our small island.

As per the above stated examples, an experimental mega-dairy is inappropriate for the Mahaulepu area. HDF seems insensitive to this fact, and to the realization that their business is not welcome at this location. The New Zealand Mega-Dairy Model is reportedly a huge failure. We don't need a mega-failure on Kauai.

Sincerely,

Diane deVries
Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā’ulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob”s”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflect in the title of the livestock waste guidance for Hawai’i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurrying application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā’ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua’i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā’ulepū site applies to mature dairy cows.
Animals in various stages of lactation and rest will be transferred between HDF and regulatory requirements, with containment in excess of the major rainfall events recorded on Kauai over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricanes, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

**FLORA AND FAUNA:**

Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the property.

EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened or proposed for listing under Federal or the State of Hawaii’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plant species occur or could survive if planted, native plants will be used in the stabilization.

No long-term impacts to native plant habitats or endangered or threatened plant species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Mahu'ulepü Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. The area does not provide critical habitat for seabirds that nest in upland areas of Kauai may overfly the site. The endangered Hawaiian goose, nēnē was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests...
The principal potential impacts posed to the five endangered species include those associated with flies and dung beetles. The stable fly, for example, can be a severe pest in dairy farms, and the stable fly population can be significantly reduced by lowering construction crane noise and using conservation fencing to project dikes from the site. In response to cattle-related insect pests, numerous species known to compete with the stable fly include parasitic micro-wasps and spreading out manure. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

To minimize potential establishment of pest flies or other insects, food waste generated during the construction phase will be bagged, covered, contained and disposed of in order to limit potential feeding habitat for flies. Improvements of the manure handling process will be implemented at the HDF site. Short-term controls, including mechanical methods (e.g., sticky tapes or ribbons in the milking parlor or traps or without trapping materials), may be used to prevent short-term spikes in pest population. Insecticides and herbicides are non-discriminatory and kill beneficial as well as pest insects. The use of integrated pest management, which utilizes knowledge of the ancient food web among species by disrupting the manure habitat required to complete their lifecycle, is expected to be effective in minimizing pest populations.

Invertebrate species are a concern for the HDF site. Pest insects such as flies can negatively impact livestock health and productivity at dairy operations. The stable fly, for example, can be a severe pest in dairy farms, and the stable fly population can be significantly reduced by lowering construction crane noise and using conservation fencing to project dikes from the site. In response to cattle-related insect pests, numerous species known to compete with the stable fly include parasitic micro-wasps and spreading out manure. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

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Lava tubes and cave-like structures are listed as a concern for the HDF site. However, neither the botanical and fauna survey conducted within and surrounding the HDF site nor the invertebrate survey revealed any evidence of lava tubes or caves on the property. Pest insects such as flies can negatively impact livestock health and productivity at dairy operations. The stable fly, for example, can be a severe pest in dairy farms, and the stable fly population can be significantly reduced by lowering construction crane noise and using conservation fencing to project dikes from the site. In response to cattle-related insect pests, numerous species known to compete with the stable fly include parasitic micro-wasps and spreading out manure. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

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To reduce livestock-related insects, IPM utilizes knowledge of the ancient food web to target other areas where manure-related flies may be a problem. An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles, and pollinators including bees, are noted in the survey. Eggs and larvae of species associated with cattle are found in manure, and these flies can be controlled using bait and/or pesticide, which may be a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kūkaʻōka 3 region, pest fly populations are dependent on food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural land, and it is recommended that manure be kept away from breeding sites for any other species that may be a problem. Locally, the food and animals waste within the area. These mitigation strategies should be implemented in the area to address any increase in population, therefore it is expected that the dairy farm will address any increase in population.

The HDF project would have little, if any, adverse impacts on the economy, as well as the parasites and predators that control these species. No federal, state, or state listed endangered or threatened species are located in or near the proposed facility. A full list of all species list is provided in Appendix B-31. A full list of all species list is provided in Appendix B-31.

The HDF project would have little, if any, adverse impacts on the economy, as well as the parasites and predators that control these species. No federal, state, or state listed endangered or threatened species are located in or near the proposed facility. A full list of all species list is provided in Appendix B-31.

A study of invertebrate species and pests in the area was conducted by Steven V. Stehling, Ph.D., Consulting Biologist at the University of Hawaii. The study summarizes the species identified within the facility and the facility’s environment.

The HDF project would have little, if any, adverse impacts on the economy, as well as the parasites and predators that control these species. No federal, state, or state listed endangered or threatened species are located in or near the proposed facility. A full list of all species list is provided in Appendix B-31.

The HDF project would contribute to diversification of Kaua‘i’s economy. With only two dairies remaining in the State (both on the Kaua‘i island), approximately 10 percent of Hawaii’s milk is locally produced. Construction of the HDF project would be expected to average about 16 direct employment opportunities associated with development. Thus, direct and indirect employment related to Dairy construction would be expected to average approximately 36 job-equivalents.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. These flies and the greenbottle fly are commonly found in areas with high pest populations. It is possible these flies could prevent and control fly population growth through efficient manure management practices. A full list of all management measures to reduce pest populations is provided in Section 4.1. The project location does not provide any habitat for fly populations. The HDF project would contribute to diversification of Kaua‘i’s economy. With only two dairies remaining in the State (both on the Kaua‘i island), approximately 10 percent of Hawaii’s milk is locally produced. Construction of the HDF project would be expected to average about 16 direct employment opportunities associated with development. Thus, direct and indirect employment related to Dairy construction would be expected to average approximately 36 job-equivalents.

Draft EIS Section 4.15 addresses demographic and economic impacts of the project on Kaua‘i. The HDF project would contribute to diversification of Kaua‘i’s economy. With only two dairies remaining in the State (both on the Kaua‘i island), approximately 10 percent of Hawaii’s milk is locally produced. Construction of the HDF project would be expected to average about 16 direct employment opportunities associated with development. Thus, direct and indirect employment related to Dairy construction would be expected to average approximately 36 job-equivalents.
indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O'ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 44 million gallons (367,197,800 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai'i. Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua'i, and 2 indirect jobs on O'ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua'i and another 8 indirect jobs on O'ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on water, and resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area's hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimānalo volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā'ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā'ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipu region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā'ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai'i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milk cooling and other milk processing equipment. Another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā'ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evaporative recycling process. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā'ulepū 14 well and the County's Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā'ulepū Valley, HDF
HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce run-off that could carry particles into surface waters. Fences will be erected 35-feet from the top of ditches. Vegetated buffer strips will be created in parallel along the ditch banks to create filter strips that could capture particulate during stormwater events. Another set of new drainage ditches and ditches flushed with sediment and farmed land will be constructed in a 10-acre area located along the site's western boundary. Built-in water channels and constructed ditches within the Waiopili Ditch must be constructed in accordance with best management practices. 

Vegetative buffer strips, stormwater basins, and constructed water channels will be the treated surface areas to manage stormwater. The Stormwater General Permit, dietary controls, and monitoring and maintenance requirements for nondrinking sources of water. Surface water resources must therefore be well-managed to accommodate the projected growth and water demand anticipated in the region through 2035. 

The HDF site is located on the bottom of the upper Waiopili Valley, which is fed by several intermittent streams coming off the south slope of the Ha'upu Ridge. These streams normally dry out cross the valley floor, and most concrete ditches parallel Waiopili and Waipio Ditch on the south side of the ridge. The Waipili Bridge and Waipio Bridge are the only structures crossing the Waiopili Ditch. The Waipili Bridge is the only structure crossing the Waiopili Ditch.

The State Department of Economic Development and Tourism (DBEDT) projects the current population of Kauai to increase from 68,000 residents in 2010 to 104,000 residents in 2035. The population increase is projected to be 59 percent. The state has established a Regional Water Demand Plan for the county that encompasses 19.2 percent of the County population. For the South Kauai region (the Waiopili Ditch area), the demand forecast is 4,190 gpm from existing agricultural operations. Additional water demands from the increased population and new development are anticipated to be 1,000 gpm. 

The HDF site is located on the bottom of the upper Waiopili Valley, which is fed by several intermittent streams coming off the south slope of the Ha'upu Ridge. These streams normally dry out cross the valley floor, and most concrete ditches parallel Waiopili and Waipio Ditch on the south side of the ridge. The Waipili Bridge and Waipio Bridge are the only structures crossing the Waiopili Ditch. The Waipili Bridge is the only structure crossing the Waiopili Ditch. 

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Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on a episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kūloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiʻo pilī Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

TRAFFIC: The Draft Environmental Impact Statement (EIS) Section 4.18 and 4.25 includes an evaluation of roadways and traffic conditions, along with potential impacts of the dairy farm construction and operation. Primary access to the site is via Māhāʻulepū Road, a two-way, two-lane road, which is accessible from Kōloa Road (HW 530) via Ala Kinoi Road. Within the project area there is a network of unimproved private agriculture haul roads that provide access to and from Māhāʻulepū Road.

Roadways in the project area operate smoothly with no periods of heavy traffic. On average, traffic in the region is much lower than urban areas in the state due to the low population of Kaua‘i and rural agricultural demographics of the south Kaua‘i area and Māhāʻulepū. Traffic on Māhāʻulepū Road consists of agricultural vehicles, residential and resort visitor traffic.

During construction, the proposed project is not expected to have a significant short term impact on traffic operations in the project vicinity. Additional traffic will be generated during construction, but will return to normal levels after project completion during day-to-day operations. There will be no change to traffic patterns or infrastructure related to the public roads.

Traffic operations along Māhāʻulepū Road and the surrounding County roads are expected to continue to operate at acceptable levels of service during peak hours of traffic. The projected increase in vehicle movements related to HDF operations for the committed herd size of 699 cows would include 5 daily employees accessing the site, milk tankers and supply trucks every two days, and truck with stock trailer, for a total of 12 additional vehicle trips per day. Daily traffic along Ala Kinoi Road and Kōloa Road was 8,000 and 6,500 cars daily; HDF-related traffic would add less than
one percent additional trips. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area.

At a contemplated herd size of up to 2,000 cows, an additional 11 vehicle trips per day would access the HDF site, for a total of 23 vehicle trips daily. Projections for daily vehicle movements in 2035 for Ala Kinoiki Road and Kūloa Road are 7,200 and 9,500 daily vehicles. HDF-related traffic would add less than one percent. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area. Traffic data is presented in the Draft EIS Sections 4.18 and 4.24.

Construction equipment mobilization will comply with Hawai‘i Department of Transportation and County requirements. Delivery trucks and milk tanker trucks will be in compliance with State and County size and weight limits; no oversized vehicles will be used for ongoing operations.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “dryplots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours - in two separate milking cycles - moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,700 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were...
intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual on-site odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

**ALTERNATIVES:** As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action's purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action's purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably feasible given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State's fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3).
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective B).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: search “Hawai’i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear David DeZerega:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required.

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The following responses are offered to your comments:

GROUP 70 OBJECTIVITY: Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai‘i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai‘i Revised Statutes and the “Environmental Impact Statement Rules” (Chapter 200 of Title 11, Hawai‘i Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State, and Federal agencies. On numerous past EIS projects, the Hawai‘i Chapter of the American Planning Association has recognized Group 70’s professional work with Chapter awards for excellence in environmental planning. Part of the EIS scoping process involves Group 70’s experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai‘i Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, rotational grazing dairy farm in Māhū‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. Moreover, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero-discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock — grass — for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Grass Code Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.
The pastural rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed, stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs,” mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditches, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. In the title of the livestock waste guidance for Hawaii is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture on Ka‘ū to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā‘ulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef mar


do benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rbST or rBGH.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kō‘ola area was built by Nāpali formation lavas of the Waimānolā volcanic series. Surface lavas of the Nāpali
formation exhibit extensive weathering which may extend to considerable depths—
as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black clayey and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor; and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Pōipi region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County's Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kauai community.

**Regional Water Demand:** The adjacent, developed Kōloa-Pōipi region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kauai will increase county-wide by 17,500 residents by 2030. The South Kauai population is estimated to reach 16,000 in 2035, when it is projected to encompass 19.7 percent of the County population. For the South Kauai region (the Kōloa - Pōipi - Kalaheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off the south slope of the Hāupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built
create filter strips that could capture particulates during stormwater runoff events. The Pollution Prevention Plan (SWPPP) has been developed as part of the application for permitting. Another setback restricts application of effluent within 50 feet of the drainageways; therefore effluent application would be limited to 20 acres per year. Natural fertilizer will be applied at a rate of 12 tons per acre per year. A commercial fertilizer will be required. Nutrients required to sustain annual growth rates of 5 inches per year would be 38,510 pounds per year, or 3.5 times the estimate of nitrogen inputs from the Waiopili Ditch. The nutrient inputs from HDF, Phosphorus for both domestic wastewater and livestock are estimated to be 120 pounds per year, or an average of 10 days annually. Per best practices, no effluent application would be conducted during rain events.

Structural controls to be utilized during construction will include 55-foot silt fence installed from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows. Sediment logs around drain inlets can discharge from the alluvium when it rises in wetter times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter times more nutrients than groundwater, due to the poor permeability of the alluvium. The groundwater engineer estimated potential nutrient throughput to adjacent watersheds. DOH conducted water sampling and analysis during a Waiopili Ditch Sanitary Survey, Kauai, Part I which showed 10,000 pounds per year, and one percent of phosphorus (totaling 900 pounds per year). Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Sanitary Water Library."
Waioli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by HCO identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua’i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EB sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai’i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylot” of confined dairy operations where animals walk over dirt and dryened manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential dust emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kaua’i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m3, well below the State standard of 150 μg/m3. The estimated concentration for PM2.5 is 0.23 μg/m3, well below the Federal standard of 35 μg/m3 (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy herifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.
The DEIS evaluates alternatives that could attain the objectives of the project’s proposed action, including those that would not be detectable by 50 percent of the sensitive population once per 200 hours, or 44 reasonable alternative against those of the proposed action. Additionally, potential Alternative Future Actions (AFA’s) are evaluated. The project’s scope is defined by a series of alternatives that could be reasonably considered against those of the proposed action. Additionally, AFA’s are evaluated against the project’s proposed action in the context of existing development, land use, and land ownership.

Four possible uses that would not meet the project’s purpose are considered: (1) the development of the Pasture-Based Dairy at an Alternative Location on Kauai; (2) conversion of the Pasture-Based Dairy to a Different Use; (3) no development of the Pasture-Based Dairy; and (4) no development of the Pasture-Based Dairy. Each of these alternatives is evaluated against the project’s proposed action using the eight Project Objectives and the four established Evaluation Criteria. These alternatives are evaluated against the project’s proposed action in the context of existing development, land use, and land ownership.

The alternatives analysis provides a comprehensive evaluation of the range of uses that could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include agricultural uses, non-agricultural uses, and no development. The alternatives are evaluated against the project’s proposed action using the eight Project Objectives and the four established Evaluation Criteria. The alternatives that do not meet the project’s purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules (HRS 11-200) require a discussion of alternatives that could be reasonably considered against those of the proposed action.

Rigorously exploring and evaluating the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid or reduce the impacts of the proposed action, is a key component of the alternatives analysis. This analysis is performed to ensure that the project’s purpose is achieved while minimizing environmental impacts.

ALTERNATIVES:

As a part of the DEIS, alternatives were evaluated to attain the objectives of the action’s purpose and need, and were compared with proposed action to determine those alternatives that could be reasonably considered against those of the proposed action. Additionally, potential Alternative Future Actions (AFA’s) are evaluated. The project’s scope is defined by a series of alternatives that could be reasonably considered against those of the proposed action. Additionally, AFA’s are evaluated against the project’s proposed action in the context of existing development, land use, and land ownership.

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GREENHOUSE GASSES:

These options would not be reasonably viable given the existing private land tenure and 4.26 address the potential for greenhouse gas emissions by Hawai'i Dairy Farms (HDF). Estimates of GHG emission rates from a pasture-based dairy, including feedlots, as reported in the Second National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) in 2014. Power generation does not include vehicle emissions and other GHG emitters on the island.

Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project’s requirements and established Evaluation Criteria. The alternatives that do not meet the project’s purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules (HRS 11-200) require a discussion of alternatives that could be reasonably considered against those of the proposed action. Additionally, potential Alternative Future Actions (AFA’s) are evaluated. The project’s scope is defined by a series of alternatives that could be reasonably considered against those of the proposed action. Additionally, AFA’s are evaluated against the project’s proposed action in the context of existing development, land use, and land ownership.

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Rigorously exploring and evaluating the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid or reduce the impacts of the proposed action, is a key component of the alternatives analysis. This analysis is performed to ensure that the project’s purpose is achieved while minimizing environmental impacts.
None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).

The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3).

However, after years of trying, it appears there was limited interest in such a venture.

Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria:

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawai‘i Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP

Principal Planner
May 26, 2016

Sara DeZerega
3018 Laua'e Place
Koloa, HI 96756

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā'ulepū Road
Kaua'i, Hawai'i

TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001: 001 portion

Dear Sara DeZerega:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai'i Dairy Farms (HDF) will establish and operate a sustainable, rotational-grazing dairy farm in Māhā'ulepū Valley on the island of Kaua'i to produce fresh, locally available nutritious milk for Hawai'i families. The rotational-grazing method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISP)N, published January 23, 2015, described the proposed pasture-based rotational grazing system as a "zero-discharge, grass-fed dairy." The term "zero-discharge" under the U.S.
management practices and pasture model applied by HDF maximize grass as the cows' primary nutrition source and minimize stress to the animals. Cows tend to be fed "grass-fed," which is defined by the USDA as what animals can and cannot be fed. The Food and Agriculture Organization (FAO) of the United Nations defines "grass-fed" as the raising of animals on grass or pasture for more than 70 percent of their diet. Therefore, HDF is using the term "grass-fed" to describe their pasture model, which is not necessarily "zero discharge," as it is being used for the constituent components that provide benefit.

The term "grass-fed" was used in the HF EISPN. This term was used to identify the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil nutrient concentrations, and agricultural practices. The timing and application of nutrients will correspond with plant uptake, soil nutrient concentrations, and agricultural practices.

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The NRCS soil classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalahi Clay at 32 percent, Ka‘ena Clay Brown Variant at 29 percent, and Luaukī Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas “drainage” refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential for impacts on waterbodies. In this way, “poorly drained” soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than “well drained” soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai‘i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.
ARCHAEOLOGICAL AND CULTURAL: The Hawai’i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-298. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising, given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic-era cultural materials associated with the many Land Commission Awards in the project area were nonexistent, as explored through survey and subsurface exploration.

The six historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites may not be adversely affected by the proposed dairy project. No site is related to burials, and no bone was found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhā‘ulepū Valley has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerus traditional cultural practices will not be impacted by establishment of the dairy.

FLORA AND FAUNA: Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened or proposed for listing under Federal or the State of Hawai‘i’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plant species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhā‘ulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kauai may overfly the site. The endangered Hawaiian goose, nēnē was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kōloa area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to the five endangered species include those associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to project-specific areas, marking tall structures and fencing with white visibility polystyrene, limiting nighttime lighting, and shading any outside lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.
It is likely that Hawaiian hoary bats overfly the project area on a seasonal basis. Herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow operations.

The potential impacts of Hawaiian hoary bats on the project area are evaluated in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 5.2, and 4.23. The technical consultants identified potential habitat that could affect the species within the study area. No suitable roost trees are present in the area, and the location and connectivity of the quality of the water and surface water were documented.

While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

GROUNDED WATER

The HDF project would create short-term benefits through jobs for local contractors, suppliers, and material suppliers. Such jobs would include field supervisors, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average approximately 36 jobs, of which 28 would be expected to average 36 jobs per year during the construction period.

Therefore, water movement through soils under the proposed dairy site would be predominantly from the alluvium, which generally extends about 60 feet under the surface and is underlain by bedrock, to the groundwater bodies with the valley. Two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is estimated to have a hydraulic conductivity of 100 feet per day, and (2) groundwater located in a soft, thoroughly decomposed rock. The hydraulic conductivity of the alluvium that underlies the area is less permeable than the unweathered volcanic material. The hydraulic conductivity of the alluvium material is 100 feet per day.

The groundwater and surface water analyses conducted for the Draft EIS show no impacts on the environment resulting from the proposed actions. The groundwater and water resources in the area were evaluated in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 5.2, and 4.23.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. The dairy is expected to generate a net additional contribution to the County of approximately $560,000 annually. The dairy farm and related dairy operations would provide approximately 9 jobs, of which the majority would be full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to ongoing dairy operations would be created.

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conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further details.

**Potable Water**: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring**: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand**: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction**: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and reporting structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality**: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waipio Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococci to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waipio Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands. Complaints from the public citing the high levels of enterococci in Waipio Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waipio Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has...
completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dune canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (https://health.hawaii.gov/cwb).

**Long-term Operations: Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageway; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 669 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of the time, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po‘ipu region were also calculated. Nitrogen input to the marine environment in the Po‘ipu region is calculated to be 36,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 14 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipu region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment:** An assessment of groundwater and surface water interaction with the marine water downstream from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment, which actively dispenses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditch downstream to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWPL, dairy neighbors and the local Kaua‘i community.
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: http://tinyurl.com/OEQCKAUAI.

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
facts were much different than what we were presented earlier. I am very concerned about the impacts.

Specific points that I believe need to be addressed in the draft EIS are as follows:

1. I am very concerned about the potential for water quality contamination of our drinking water and run off. This carries concerns also about the public health of Kolow/Poiupu residents and our tap water and beaches and aquatic life.

2. I am concerned about the location of the milking area and waste ponds. They are very, very close to the aquifer. I would like to see the data examined for the harmful impacts of the waste ponds in regards to leaching into the aquifer and overall cleanliness of holding waste in this manner.

3. The amount of water consumed for operation is enormous. The dairy may feel they own the self-replenishing aquifers and all the water they want from the Waitea Reservoir, but they don't. I question why we would use such a large amount of our water resources on yet another type of agriculture that leaves our island and gives us nothing to eat. Please include in the EIS a water usage analysis.

4. The EIS must include the consideration of other reasonable locations both on Kauai and perhaps also on the other islands, including the island it will be ultimately processed and packaged on.

5. The EIS must include detailed and accurate soil and hydrological data of the entire ahupua'a of Maha'ulepu. It must address the complete watershed, including the lava tube system, and show that no run off will occur under any circumstance.

6. We must include study and disclosure about what integrated pest management plan for fly control, and if this would require the potential for pesticide application.

7. The importance of Maha'ulepu to the south shore for the residents, fishermen, geologists, archeologists, the students and the visitors, should require that bonding mitigation measures are in place, such as an environmental remediation bond and continual monitoring protocols. Such monitoring and sampling must include community involvement and disclosure.

8. The EIS must include environmental indicators and metrics to determine what size of a herd the land and resources can support without damaging the ecology of the valley and the surrounding towns.

9. The EIS must include plans for site remediation for when the lease ends. Site remediation must include a guarantee from HDF that Maha'ulepu will be fully restored to its current condition. A remediation fund should be required to cover the costs of damage or impact to its natural state.

10. We must study the impacts on cultural practices, cultural sites, hunting, and hiking. The ahupua'a of Maha'ulepu as the last remaining, easily accessible, undeveloped coastline deserves our highest stewardship. It is a natural and living museum. It is an important example of how things used to be. It provides unparalleled beauty and outdoor classroom for our local children.

11. I would like for the EIS to include encouragement for the HDF plan to avoid the importation and feeding of genetically engineered corn for cow feed. Consumers are seeing out truly grass fed dairy milk and they avoid milk from GE grains. Alternatives exist. If the milk produced did not include GE grains, there could be a local use for the milk fat to remain on island and become a value added product like yogurt.

Please keep in mind that we would know the importance of food security and ecological soundness and historical conservation. I feel that this plan from HDF provides none of these measures. It is the wrong location for a model that takes from important resources and leaves the community with only negative impacts. I can see no community benefit.

Thank you for incorporating these comments into the draft EIS scoping project. Please remember, or visit, this special site. I am sure you understand the significance of this area, not only our community, but to future generations.

Mahalo and aloha 'ina

Jeri DiPietro
PO Box 338
Koloa, HI 96756
808 828 1132
ofsteie@aol.com
May 26, 2016

Jeri Di Pietro
PO Box 338
Koloa, HI 96756
dstone@ad.com

Dear Jeri Di Pietro:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will continue the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agriculutural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yield essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways
and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

The NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai’i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, application method, and timing of plant nutrient and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 600 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 600-cow dairy. Throughout the less than 30-day storage period, effluent is planned for the cattle and the effluent application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua’i to be raised off-site. The committed herd size of 600 mature dairy cows at the Māhāʻulepū site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and insure the beef market in Hawai’i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as HST or rBGH.

SOILS: Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during drier periods, to filter and buffer potential pollutants from leaching fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yont and Nicholas Krueger of the University of Hawai’i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua’i Soil & Water Conservation District in December, 2012.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soils Resource Report for Island of Kaua’i, Hawai’i.” The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data...
the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalihi Clay at 32 percent, Kā'ena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas “drainage” refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential for impacts on waterbodies. In this way, “poorly drained” soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than “well drained” soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai’i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbon in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical regions, partly due to long pasture-growing season. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

**ARCHAEOLOGICAL AND CULTURAL**

The Hawai’i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising, given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic-era cultural materials associated with the many Land Commission Awards in the project area were nonexistent, as explored through survey and subsurface exploration.

The historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on land owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bonework was found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhāulepū Ahupua’a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the...
exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area’s hydrology is shaped by its geology. The Kāloa area was built by Napali formation lavas of the Waimānalo volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprilithe, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kāloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kāloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kāloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kāloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and surface water in the alluvial material were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kāloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kāloa - Po‘ipū - Kalibhea districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 projects the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**
The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā'uōpili Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā'uōpili watershed.

The HDF site is located on the bottom land of the upper Māhā'uōpili Valley, which is fed by several intermittent streams coming off of the south slope of the Ha'upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā'uōpili Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhā'uōpili and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā'uōpili Valley. The deme canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The

This groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā'uōpili will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, the runoff contributions would be limited to periods of the major rainfall over 0.8
reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawaii Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. Those options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kau‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4). The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient
contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3).

- However, after years of trying, it appears there was limited interest in such a venture.

- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).
To Whom It May Concern-

It should be obvious that a dairy will have significant impact on the environment and human health, unless many, many safeguards are put in place in advance and protocols for monitoring. Of note, what happens to all the bovine excrement? How is it treated or is it treated so as not to contaminate ground water and our oceans? How does a dairy alter the environment and what can be done to insure that the environment is not altered? Who monitors this? And lastly, what is the effect on humans? A dairy will attract flies and other insects, which can carry disease. What safeguards will be put in place to help guarantee that the impact on humans is non-existent?

Michael Diamant, MD
Kalaheo, Hawaii

This communication, including any attachments, is intended solely for the use of the addressee and may contain information which is privileged, confidential, exempt from disclosure under applicable law or subject to copyright. If you are not an intended recipient, any use, disclosure, distribution, reproduction, review or copying is unauthorized and may be unlawful. If you have received this transmission in error, please notify the sender immediately. Thank you.
CAFO is a system designed to discharge pollutants into waters of the United States. CAFOs must be large livestock operations, and the term is used to identify farms with more than 1,000 animal units or 1,000 animal units of livestock by species. CAFOs are subject to permitting requirements under the Clean Water Act (CWA) and the National Pollutant Discharge Elimination System (NPDES) program. The term is used for farms that discharge pollutants to waters of the United States and are not subject to NPDES permits due to their small size. CAFOs are regulated under the Federal Agriculture Improvement and Risk Management Act of 1996 (FAIRMA).

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent from the dairy facility. The irrigation system is designed to distribute water uniformly across the pasture, minimizing runoff and ensuring adequate moisture for the grass. The irrigation system will be controlled using computer software and GPS receivers, allowing for precise application of water and nutrient management. The irrigation system will be designed to accommodate future expansion of the pasture area.

The pasture-based model provides a local feedstock – grass – as the cows' primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass and suitable sites to support sufficient production. NRCS provides technical guidance on applying agricultural waste depending on the actual use of the waste. Reflected in the title of the livestock waste guidance for Hawaii is the parthenial inclusion of the word “nutrients.” Where possible, nutrients are returned to the pasture to enhance productivity and improve and maintain water quality.

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The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total project area.

Agricultural infrastructure and utilities required for the dairy operations will be located at the western end of the site, and access to the new buildings will be provided from the existing access road. Additional building information can be found in Draft EIS Section 3.3.1.

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other partner ranches as needed for animal health and dairy productivity. This will help expand the dairy and infuse the beef market in Hawaii with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawaii Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16.1, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waiman volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black alluvial clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that overlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poʻipiʻi region is on the order of 201 – 500 feet per day.

Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Poʻipiʻi region shows large and increasing demand for potable water for community and resort development.
The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua’i will increase county-wide by 17,300 residents by 2030. The South Kaua’i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua’i region (the Kōloa - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a stream from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery.

Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data; however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for nearly nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopied along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainage way (totaling 70-feet in width) to keep cows away from surface water. Vegetated buffers will be established between the fences and drainage ditches, to control erosive strips that could capture particulates during storm events. Another setback restricts application of effluent within 50 feet of the drainages; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the
current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.2 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement (EIS) is based on the potential for nutrients and bacteriological constituents to not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the Department of Conservation and local residents.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL:

http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Sir or Madam,

I personally feel like the proposed planned dairy for Maha'ulepu is an unsafe, overreaching plan that should be put on hold at this time until an independently contracted EIS can be done. I believe that the concentrated rotational dairy proposed by HDF is far too much waste to add safely to the area in question. Soil testing needs to be taken seriously, with the long-term effects of grazing management systems and their impacts on soil quality and water quality in local wells preeminent.

A Voluntary "EIS" is a travesty to those concerned with the long-term viability of Kauai’s Tourism in the Poipu area. A large, high-density dairy is not what was likely envisioned for Mahalepu’s agricultural zoning and is also extremely close to residential zoning.

Kauai can support good neighbor business when care for local resources and not just a profits first mentality is part of the mission statement.

Kauai has supported small dairies in the past with the largest herd of less than 500. These dairies were located in more rural locations with herds rotated to different pastures. The proposed dairy in Mahalepu is a completely different practice and will have much more concentrated effect on the pasture land in question.

Kauai will change with the times however it is all our concern as people of Kauai to steward a future that balances new opportunities without losing others or perhaps creating insolvable problems.

I am disappointed that our Department of Health is not taking part in this EIS.

Jay Dorrance
Kapaa, Kauai
planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State and Federal agency. On numerous past EIS projects, the Hawaii Chapter of the American Planning Association has recognized Group 70’s professional work with Chapter awards for excellence in environmental planning. Part of the EIS sequencing process involves Group 70’s experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawaii Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

**Dairy Operations:** Hawaii Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhāulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawaii families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mocks”, mimicking the natural social order of herds. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and roads minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow roads are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waihau Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.
NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawaii is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 5.5.5, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā‘ulepū site applies to mature pasture application. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy production goals. This will benefit both the dairy and infuse the market in Hawaii with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the herd or sold as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe the use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

SOILS: Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during dry periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawaii at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soils Resource Report for Island of Kaua‘i, Hawai‘i.” The report was generated from the USDA NRCS website, which allows internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kāhilani Clay at 32 percent, Ka‘ena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015 and focused on evaluation of soils characterized as “poorly drained,” and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus calcium, magnesium, and potassium.
Poorly drained is not an indication of low or poor infiltration. Infiltration refers to
the ability of water to enter the soil surface, whereas “drainage” refers to
the movement of water within or from the soil profile. Poorly drained soils typically
have low hydraulic conductivity, or a slow rate of groundwater movement through
the soil. This slow movement can create anaerobic conditions, which typically result
in higher rates of denitrification. This is the conversion of potentially nitrites and
nitrates to gaseous forms, which reduces the potential for impacts on waterbodies.
In this way, “poorly drained” soils may represent less risk of nitrate and nitrite
leading to associated waterbodies than “well drained” soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of
nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF
site are known to adsorb and retain large amounts of phosphorus. Under the NRCS
phosphorus leaching index for Hawai’i soils, HDF soils show low risk for leaching.
With low risk, phosphorus can be applied at rates greater than crop requirements if
manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in
soils through use of manure as a natural fertilizer. Soil can incorporate carbon from
the atmosphere, which benefits soil health. According to recent studies in the Soil
Science Society of America Journal, the conversion of formerly tilled cropland to
grazed pasture can drive substantial accumulation of organic carbons in soil, with a
potential to offset up to one-third of the annual increase in atmospheric carbon
dioxide. The potential soil organic matter and carbon dioxide sequestration benefits
are likely greatest in highly degraded soils in warm subtropical climates, partly due
to long pasture-growing seasons. Long-term soil impacts are anticipated to result in
improvement to the physical, chemical, and biological condition of the soil.

This response letter accompanies your copy of the Draft Environmental Impact
Statement (EIS). The Draft EIS is available on the OEQC website at the following
URL: search “Hawai’i Dairy Farms”: http://tinyurl.com/OEQCKK4UA

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

February 20, 2015

Mr. Jeff Overton
Group 70 International, Inc.
925 Bishop Street, 5th Floor
Honolulu, HI 96813

Dear Mr. Overton,

My family has lived in Koloa, Hawaii for decades. We swim at Poipu beaches and
often frequent the area to dine or for recreation. It’s home, a bastion of peace,
safety and comfort. The proposed dairy in Maha’ulepu, as we see it, will completely
destroy life on the South Side and beyond as we now know it.

Four wells that serve as sources of public drinking water for Koloa and Poipu are
close to the area of the dairy designated to receive pumped manure sludge when
drainage the effluent ponds. Scientists specializing in agricultural operations have
issued a dire warning: The risk of water CONTAMINATION from migrating bacteria
and nitrites would be great. This translates into not only exposing South Side
residents to contaminated drinking water but also the thousands of visitors who
arrive annually and infuse the economy with millions of dollars.

A herd of 2,000 dairy cows (Phase II) will produce millions of pounds of manure
monthly. HDF’s plans claim zero waste elimination but the NRCS’s June 2014
study, “Custom Soil Resource Report”, concludes that the soil on this site is
“very limited” in its ability to absorb animal waste and risk of runoff is “high” or
“very high”. Millions of pounds of runoff flowing into the ocean waters of the
South Shore - a monumental environmental and economic disaster in the making
for the entire South Shore. HDF’s plan calls for the creation of 10-15 new jobs.
And what of the thousands who will lose jobs as we watch the demise of the hotel
and visitor industry and other related businesses - restaurants, those engaged in
water sports, sightseeing, etc.?

Entomologists have stated that the dairy will swarm billions of flies within months -
the biting variety with serrated mouths that live on blood - and they will inhabit a
radius of five miles. What plans does HDF have in place to address this serious
health threatening situation?

Maha’ulepu’s spectacular landscape is home to endangered species, irreplaceable
natural, cultural, historic, agricultural and scientific resources - petroglyphs, a heiau
and unexcavated sites are amongst the treasures to be found in the area. Surely
we owe it to the Native Hawaiians to honor all that is sacred to them. In honoring
them, we preserve for ourselves the sites that is irreplaceable. Endangering or
destroying these sites would be an unconscionable act.
May 26, 2016

Ellen Ebata
P.O. Box 1226
Koloa, HI 96756-1226

Subject: Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i

PRINCIPALS

Francis G. Oda, AIA, LEED AP
Norman O.T. Hung
Sheryl E. Seaman
Ray H. Kishi
James M. Nakamura
Stephen Yuen
Linda G. Matsumoto
Jeffrey M. Okafuye
Christine Mendez Rutkala
James L. Stone, AIA, LEED AP
Katherine M. McNelis
Toh Young, MBA
Paul T. Matsuda
Ma By Kim

OF COUNSEL

Ralph E. Portmore

Hitoshi Hida

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPAN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S.

Sincerely,

Ellen T. Ebata
Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP N. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the daily herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture or a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāʻulepū site on Kauaʻi have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting out in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

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Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in water, soil, and natural resources management. These practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soils Resource Report for Island of Kaua‘i, Hawai‘i.” The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon what data the user would like to display. These user-generated reports are not evaluated by NRCS.
NATURAL HAZARDS: The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhāʻulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawaiʻi Dairy Farms (HDF) lies between the 60 and 150 foot elevation, outside the tsunami evacuation zone. The Kauaʻi and Niʻihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands.

Although they occur infrequently, Kauaʻi has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhāʻulepū region during and following the hurricanes that affected Kauaʻi in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhāʻulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events received on Kauaʻi over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

ARCHEOLOGICAL AND CULTURAL: The Hawaiʻi Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-208. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugar cane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intensive sugar cane cultivation on the valley floor. Even historic era cultural materials associated with the many Land Commission Awards in the project area were non-existent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhāʻulepū Ahupuaʻa, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully endorsed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are confined within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

FLORA AND FAUNA: Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the
A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The survey summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhāʻulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and musaphilia. Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawaii for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhāʻulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pads in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōloa-Poipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Alaka‘i Forest Road between Kōloa and Poipū, and it is likely that the livestock-related flies identified at the HDF site occur in this region as well. Localized control to reduce pest populations need to address breeding sites in and amongst the food and animal wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.
DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kau‘ai, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct plus indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kau‘ai.

The HDF project would contribute to diversification of Kau‘ai’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. Ongoing dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kau‘ai, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,700 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kau‘ai, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kau‘ai and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kūloa area was built by Nāpali formation lavas of the Waimāna volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā’ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kūloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā’ulepū Valley and the HDF site ranges from 105 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kūloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two water bodies within Māhā’ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered...
Ellen Ebata  
May 26, 2016
Page 13 of 16

EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evaportranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōlōa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōlōa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōlōa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōlōa - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waipoi Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Management Plan has been completed Part I of its report: *Waiopili Ditch Sanitary Survey, Kaua‘i, Part I.* The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs...
from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pastures growing with the committed herd size of 669 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kūkoʻa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 36,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR dairy neighbors and the local Kauaʻi Water Quality Branch.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaiʻi Dairy Farms”: http://tinyurl.com/OEQCkaual
Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

February 21, 2015

Laura McIntyre
State of Hawai‘i
Department of Health
1250 Punchbowl Street
Honolulu, HI 96813

RE: COMMENT ON HAWAII DAIRY FARM’S ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE, DATED JANUARY 2015.

Dear Ms. McIntyre,

My husband and I have many concerns regarding this proposed Hawai‘i Dairy Farm (HDF) in Maha‘ulepu on Kaua‘i. We have lived in our home in the Bay View House Lots of Poipu Kai, just adjacent to the Grand Hyatt Resort and Spa, for over 17 years. It had long been a dream of ours to live here and enjoy the beauty and peace that this area offered. Now that we are about to retire and realize that dream, along comes HDF. Even without HDF completed we are suffering financial loss on our property investment. As much as $500,000.00 already and not a single cow in place yet. Just that fact that this project could come to fruition we have lost THAT much value. We have been told that if completed our total value would go down by at least 50%. That’s one heck of a hit! These are our selfish reasons for not wanting HDF in our area, following are all the other reasons this just does not make any sense.

The environment in Maha‘ulepu cannot handle the dairy. The resources, our wells, cannot handle the contamination that will come with that much waste. The airborne fumes from the waste (urine and solid), the flies will be horrible and we are down wind most of the time. The soil will not handle this and will then go on to contaminate not just the land but the ocean and marine environment. We fish out there and feed our families, we enjoy the beach and marine life, Hawaiian Monk Seals frequent the beaches of Maha‘ulepu, and of give birth and raise their pups there. Hawaiian Monk Seals are on the Endangered List and are the most endangered marine mammal in the United States. As an endemic species of the Hawaiian Islands they feed and breed in the waters. Sleep on our beaches. Maha‘ulepu is one of their habitat and would be forever ruined.

Our drinking water wells are located adjacent to these effluent ponds and stand to become contaminated forever. Where will we get our drinking water? And speaking of water, where will this 3 million gallons of water they need per day come from? The water from the mountains that collects in Waiau Reservoir belongs to all of us and is not for sale to HDF by their landlord. What about flooding, such as happened in 2006? The whole valley out there was under water and they were spilling overflow from Waiau that ran to Maha‘ulepu. What will happen to their containment ponds where we have rains like that?

We could go on and on why all this does not make sense to place a dairy in such a sensitive area, we have to consider the cultural significance of this area also before it’s too late!
May 26, 2016

Ronalee and Eric Eckberg
P.O. Box 1088
Koloa, HI 96756
ronalee65@yahoo.com

Subject: Hawai’i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhūʻulepū Road
Kauaʻi, Hawaiʻi
TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Ronalee and Eric Eckberg:

Thank you for your letter concerning the Environmental Impact Statement
Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to
demonstrate the pasture-based system as an economically and environmentally
sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’
health, grass productivity, and effluent management will be used to ensure
environmental health and safety, as well as best management practices, and help
determine the ultimate carrying capacity of the land. With proven success at a herd
size of 699, HDF will contemplate the possibility of expanding the herd in the future.
For dairy operations with 700 or more mature dairy cows, additional regulatory
review and permitting by the State Department of Health is required. At the
discretion of HDF, management may choose to expand operations up to the carrying
capacity of the land, which is estimated to be up to 2,000 productive milking dairy
cows. Permit process compliance would be followed at such time HDF may decide to
pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS**: Hawai‘i Dairy Farms (HDF) will establish and operate a
sustainable, pastoral rotational-grazing dairy farm in Māhūʻulepū Valley on the
island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i
families. The rotational-grazing method utilizes 100 percent of the cows’ manure as
natural fertilizer to grow pasture grass as a primary source of nutrition for dairy
cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of
the Draft Environmental Impact Statement (EIS), the proposed facilities and
operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPNI) published
January 21, 2015, described the proposed pasture-based rotational grazing system
as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP/N. This term was used to identify HDF’s intent to utilize a locally-produced feedstock—grass—for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed,” the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastural rotational-grazing dairy provides a local feedstock—grass—as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā’ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs,” mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices related to pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Wai‘ā Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste management plan is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 390, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā’ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of
SOILS: Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during dryer periods, to filter and buffer pollutant pollutants from leaching fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil qualities, and anticipated impacts from efficient and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawai‘i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in a watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soils Resource Report for Island of Kaua‘i, Hawai‘i.” The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalihi Clay at 32 percent, Kāena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients; which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen, phosphorus, calcium, magnesium, and potassium. Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas “drainage” refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrate and nitrite gases to gaseous forms, which reduces the potential for impacts on waterbodies. In this way, “poorly drained” soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than “well drained” soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NCES phosphorus leaching index for Hawai‘i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbon in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due

699 mature dairy cows at the Māhāulepū site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rGH.
to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

**NATURAL HAZARDS**: The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhāʻulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai‘i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone. The Kaua‘i and Niihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands.

Although they occur infrequently, Kaua‘i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhāʻulepū region during and following the hurricanes that affected Kaua‘i in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhāʻulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua‘i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

**FLORA AND FAUNA**: Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened or proposed for listing under Federal or the State of Hawai‘i’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhāʻulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kaua‘i may overfly the site. The endangered Hawaiian goose, nēnē was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kōloa area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to project-specifed areas, marking tall structures and fencing with white visibility polypile, limiting nighttime lighting, and shading any outside lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.
It is highly likely that Hawaiian hoary bats overfly the project area on a seasonal basis. Results of technical studies and the findings values in the area, and evaluated conditions project are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23. The technical reports were determined, and the quality of groundwater and surface water was documented.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of the project on the local economy were evaluated in the Draft Environmental Impact Statement (EIS) Section 4.15. The EIS Section 4.15 completed in April, 2016 by consultant Pacific Environmental Consultants, provided for the construction personnel and local economy. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average approximately 36 jobs, of which 28 would be on Kauai.

WATER QUALITY: The groundwater and surface water resources in the area were evaluated in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23. The technical reports were determined, and the quality of groundwater and surface water was documented.

Hydrology: The HDF project would contribute to diversification of Kauai’s economy, which is highly based on the tourism industry. Only two dairies remain in the State of Hawaii and the dairies on the Island of Kauai would provide an additional 699 cows and 11.2 million gallons of milk annually, a 50 percent increase in statewide milk production. Ongoing dairy operations are expected to average about 12 jobs per year during the construction period. Thus direct-plus-indirect employment associated with construction would be expected to average approximately 36 jobs, of which 28 would be on Kauai.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is saturated beneath thick alluvium, which generally extends about 60 feet beneath the surface. The groundwater within this aquifer is highly productive. The alluvium material underlying the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvial material underlying the valley floor is less than the hydraulic conductivity of the unweathered volcanics by orders of magnitude.

The alluvial material consists of fine to coarse sand and silt, with occasional gravel and cobble. The alluvial material is generally brown to black clay and clayey silt. The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is saturated beneath thick alluvium, which generally extends about 60 feet beneath the surface. The alluvium material consists of fine to coarse sand and silt, with occasional gravel and cobble. The alluvium material is generally brown to black clay and clayey silt.
conduct to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable drinking water quality) water from groundwaters provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Kōloa F well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,500 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed. The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels the Railroad to the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands. Structures to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands. Complainants from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has...
completed Part I of its report: *Waiopili Ditch Sanitary Survey, Kauai, Part I*. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (https:// health.hawaii.gov/cwb).

Long-term Operations: Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageways (totaling 75-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analyses conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Pō’ipū region were also calculated. Nitrogen input to the marine environment in the Pō’ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pō’ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be initiated in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWP, dairy neighbors and the local Kaua’i community.
**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. ER sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

**DUST**

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dry manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₀.₅ and PM₁₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₀.₅ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₁₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF; so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670 feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual odors in the area are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawaii’s Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Attention: Jeff Overton – Group 70 International, Inc.

RE: Hawaii Dairy Farm Environmental Impact Study for operations on Kauai.

My husband and I own a small condo in the Poipu Area and we will be retiring to the beautiful island of Kauai within the next 3 years.

We were very surprised to hear that Hawaii Dairy Farms, LLC is proposing an Industrial Dairy Farm at Maha‘ulepu on Kauai with a herd of up to 2000 cows.

We are very happy that there is an Environmental Impact Study being completed but we have many concerns and questions.

My mother was raised in a dairy farming family. My grandparents were dairy farmers and a number of generations before them were as well. They all used “sustainable” and “grass fed” farming practices. My cousins continued the family dairy farming up until just recently.

My family’s farm consisted of 100 acres with a total of 25-30 humanely treated adult purebred Holstein cows. They grazed daily in the summer, spring and fall on 10 – 20 acre pastures in a rotational manner to preserve the soil. The land was also used to grow all of the feed required for the animals. They ate only food grown on the land within the 100 acres. Crops (no corn) were grown and stored for winterfeed and to augment feed when they arrived in the barn for milking twice a day. This was and is sustainable grass-fed dairy farming.

HDF is proposing a “Grass Fed” Dairy with cows grazing on 500 acres of land that is within 4/5th of a mile of the Pacific Ocean at Maha‘ulepu. They plan to start production with 699 cows and then move to 2000 cows over time. In HDF’s proposal at start-up they will have 115 cows in each 4 acres of paddock area per day and at full production 330 cows on each of these paddocks.

500 acres sounds like a lot of land to graze 699-2000 cows on, but basically it means that during the start-up phase 7 cows would be grazing and defecating on 10,000 square feet of “pasture”, the size of a standard house lot. At full production it would mean that at least 17 cows would graze and defecate on the same area.

According to the EPA a dairy cow defecates at least 120 pounds of wet manure every day. In their Waste Management Plan, page 42, HDF reports that they anticipate their dairy cows will each weigh 1,200 pounds and produce 143 pounds of wet manure per cow daily. Using HDF’s own waste expectations, at full production HDF’s 2,000 cows would produce 2,648 pounds of wet manure on a 10,000 square foot area every day! Imagine having more than one ton of manure added to your lot daily. My husband and I live in a standard house lot of about 10,000 square feet. As I write this and look out my window and try to understand the impact of the concentrated rotational dairy proposed by HDF, I can’t imagine anything left of my yard after 17 cows graze, defecate and urinate for even one day. How is HDF going to handle all this manure? How will they keep it from run-off into the wells, streams and ocean? This must be addressed in the EIS.

This manure is not just manure, it is filled with the drugs that the modern farming practices give to these animals such as growth hormones and antibiotics - these will be part of the run-off so how will this affect humans, animals, birds and fish both on land and in the ocean? This too much be addressed in the EIS.

According to HDF, the cows rotate through the grazing paddocks, returning to the pasture paddocks first grazed every 18 days. Not only will the grass be unlikely to re-generate in that short an interval but the manure will still be wet and likely contribute to hoof rot when trampled by the returning herd. This needs to be addressed in the EIS.

The dense grazing will not only sicken the cows, there is also a very real risk to the public’s health. There were cases of E.coli in 2006 that were caused by spinach contaminated by feces from cattle nearby. There were 3 deaths and many were sickened. With all the rain on Kauai won’t there be a risk of contamination just by run-off? Will the flies carry disease to our food or any containers we eat from? These need to be addressed in the EIS.

What about the chemicals that will be in use to clean the cows and the milking structure and other facilities on-site? This needs to be addressed in the EIS.

I know they use iodine to wash cow udders. When that gets into the run-off who or what does that harm? This too needs to be addressed in the EIS.

What about large animal vets? Are there enough on the island to make
sure these animals are healthy as they need to be examined on a regular basis? This needs to be addressed in the EIS.

In Industrial Farming a cow has only a 5 year life expectancy. Where will all the deceased animals be disposed if they cannot be used for hamburger meat? Could this be another possible contaminant? This needs to be addressed in the EIS.

HDF will have to bring in additional feed for these animals. From where will this additional feed come? I know that there will be an opportunity for farmers on-island to grow crops but what if that does not happen. When additional feed is brought in from other areas what pests, or other contaminates will be introduced to the environment that could cause disease to the plant, animal and human life on the island? This also needs to be addressed in the EIS.

In the Poipu area, we have wildlife that is already protected like the Monk Seal and the Sea Turtle. We also have a tremendous number of fish species living on the reefs on the island. Will these animals and fish or the reefs be harmed from the run-off? This needs to be addressed in the EIS.

My husband and I rent our home at this time and are responsible for collecting over $13K into the GET and TAT per year. If you multiply that by the number of other vacation rentals in the area it represents a large amount of lost revenue to the State of Hawaii if the tourists stop coming due to odor and flies. Will this possible impact to the state taxes be addressed in the EIS?

Please ensure that the EIS for this project is being done fairly and based on facts that will ensure that the Poipu Coastline will not be negatively impacted.

Thank you for your consideration.

Sincerely,

Beverley Ellul
bellul@aol.com
1283 Quail Creek Circle,
San Jose, CA 95120
408-203-4700

Aloha
This email confirms receipt of your comments regarding the Hawaii Dairy Farms project. Questions and comments on environmental resources will help shape the content of the Draft Environmental Impact Statement. Substantive comments with responses will be published in the Draft EIS.
Thank you for participating in the environmental review process.
Mahalo,
Laura

Laura Leialoha Phillips McIntyre AICP
Program Manager, Environmental Planning Office
Hawaii State Department of Health
919 Ala Moana Blvd. Rm. 312
Honolulu, Hawaii 96814
Direct Phone: (808) 586-4338
Email: laura.mcintyre@doh.hawaii.gov
Website: http://health.hawaii.gov/epo

Ua mau ke ea o ka aina i ka pono
Attention: Ms. Laura McIntyre:

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According to the EPA a dairy cow defecates at least 120 pounds of wet manure every day. In their Waste Management Plan, page 42, HDF reports that they anticipate their dairy cows will each weigh 1,200 pounds and produce 143 pounds of wet manure per cow daily. Using HDF’s own waste expectations, at full production HDF’s 2,000 cows would produce 2,648 pounds of wet manure on a 10,000 square foot area every day! Imagine having more than one ton of manure added to your lot daily. My husband and I live in a standard house lot of about 10,000 square feet. As I write this and look out my window and try to understand the impact of the concentrated rotational dairy proposed by HDF, I can’t imagine anything left of my yard after 17 cows graze, defecate and urinate for even one day. How is HDF going to handle all this manure? How will they keep it from run-off into the wells, streams and ocean? This must be addressed in the EIS.

This manure is not just manure, it is filled with the drugs that the modern farming practices give to these animals such as growth hormones and antibiotics - these will be part of the run-off so how will these affect humans, animals, birds and fish both on land and in the ocean? This too much be addressed in the EIS.

According to HDF, the cows rotate through the grazing paddocks, returning to the pasture paddocks first grazed every 18 days. Not only will the grass be unlikely to re-generate in that short an interval but the manure will still be wet and likely contribute to hoof rot when trampled by the returning herd. This needs to be addressed in the EIS.

The dense grazing will not only sicken the cows, there is also a very real risk to the public’s health. There were cases of E.coli in 2006 that were caused by spinach contaminated by feces from cattle nearby. There were 3 deaths and many were sickened. With all the rain on Kauai won’t there be a risk of contamination just by run-off? Will the flies carry disease to our food or any containers we eat from? These need to be addressed in the EIS.

What about the chemicals that will be in use to clean the cows and the milking structure and other facilities on-site? This needs to be addressed in the EIS.

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What about large animal vets? Are there enough on the island to make sure these animals are healthy as they need to be examined on a regular basis? This needs to be addressed in the EIS.

In Industrial Farming a cow has only a 5 year life expectancy. Where will all the deceased animals be disposed if they cannot be used for hamburger meat? Could this be another possible contaminate? This needs to be addressed in the EIS.

HDF will have to bring in additional feed for these animals. From where will this additional feed come? I know that there will be an opportunity for farmers on-island to grow crops but what if that does not happen. When additional feed is brought in from other areas what pests, or other contamimates will be introduced to the environment that could cause disease to the plant, animal and human life on the island? This also needs to be addressed in the EIS.

In the Poipu area, we have wildlife that is already protected like the Monk Seal and the Sea Turtle. We also have a tremendous number of fish species living on the reefs on the island. Will these animals and fish or the reefs be harmed from the run-off? This needs to be addressed in the EIS.

My husband and I rent our home at this time and are responsible for collecting over $13K into the GET and TAT per year. If you multiply that by the number of other vacation rentals in the area it represents a large amount of lost revenue to the State of Hawaii if the tourists stop coming due to odor and flies. Will this possible impact to the state taxes be addressed in the EIS?

Please ensure that the EIS for this project is being done fairly and based on facts that will ensure that the Poipu Coastline will not be negatively impacted.

Thank you for your consideration.

Sincerely,

Beverley Ellul
bellul@aol.com
1283 Quail Creek Circle,
San Jose, CA 95120
408-203-4700
Attention: Ms. Laura McIntyre:

RE: Hawaii Dairy Farm Environmental Impact Study for operations on Kauai.

My husband and I own a small condo in the Poipu Area and we will be retiring to the beautiful island of Kauai within the next 3 years.

We were very surprised to hear that Hawaii Dairy Farms, LLC is proposing an Industrial Dairy Farm at Maha'ulepu on Kauai with a herd of up to 2000 cows.

We are very happy that there is an Environmental Impact Study being completed but however were very disappointed of the very close relationship of HDF and Group 70 International that is compiling the study. We have many concerns and questions.

My mother was raised in a dairy farming family. My grandparents were dairy farmers and a number of generations before them were as well. They all used “sustainable” and “grass fed” farming practices. My cousins continued the family dairy farming up until just recently.

My family’s farm consisted of 100 acres with a total of 25-30 humanely treated adult purebred Holstein cows. They grazed daily in the summer, spring and fall on 10 – 20 acre pastures in a rotational manner to preserve the soil. The land was also used to grow all of the feed required for the animals. They ate only food grown on the land within the 100 acres. Crops (no corn) were grown and stored for winterfeed and to augment feed when they arrived in the barn for milking twice a day. This was and is sustainable grass-fed dairy farming.

HDF is proposing a “Grass Fed” Dairy with cows grazing on 500 acres of land that is within 4/5 of a mile of the Pacific Ocean at Maha'ulepu. They plan to start production with 699 cows and then move to 2000 cows over time. In HDF’s proposal at start-up they will have 115 cows in each 4 acres of paddock area per day and at full production 330 cows on each of these paddocks.

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Thank you for your consideration.

Sincerely,
Beverley Ellul
bellul@aol.com
1283 Quail Creek Circle,
San Jose, CA 95120
408-203-4700
experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai‘i Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a "zero-discharge, grass-fed dairy." The term "zero-discharge" under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term "zero discharge" as it was constructed as no nutrients into the system.

The term "grass-fed" was used in the HDF EISPN. This term was used to identify livestock manure management practices. The HDF EISPN stated that "grass-fed" refers to grazing that will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastural rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient "dry matter" grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob,” mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer; productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Watta Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivot can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and...
irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

**FLORA AND FAUNA:**

Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under federal or state of Hawai‘i’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plants species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammal species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhāulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kaua‘i may overfly the site. The endangered Hawaiian goose, nēnē was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kōkua area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to project-specific areas, marking tall structures and fencing with white visibility polytype, limiting nighttime lighting, and shading any outside lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

**DEMOGRAPHIC AND ECONOMIC**

The potential impacts of Hawai‘i’s Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plachy Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix 1.
The HDF project would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai'i Island), approximately 10 percent of Hawai'i's milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk would be produced. This would double local milk production currently supplied by operational dairy farms on O'ahu.

The dairy is expected to generate a net income of $8,000 to $360,000 annually in the County of Kaua'i, depending on the actual herd size. Additional employment generated by a possible expansion to accommodate the committed herd size of 699 cows is estimated to be approximately 3 full-time equivalent jobs. The dairy's production will be sold primarily to the local market, with some milk being delivered to processing facilities for conversion into products such as cheese and butter.

The HDF project's environmental impact will be limited to the immediate vicinity of the dairy site. The operation will not cause any significant adverse effects on the environment, water quality, or air quality. The proposed dairy is expected to have a negligible impact on the ecological and socio-economic environment of the area.

The HDF project is subject to the approval of the County of Kaua'i, and any changes in the proposed plan will be evaluated through an updated draft environmental impact statement (EIS). The project is expected to commence in the near future.
Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā'ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā'ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hā'upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā'ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction. The dairy facility and associated infrastructure operation, and the 4,500-foot distance between the Māhā'ulepū 14 well and the County’s Kōkoʻa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōkoʻa-Poʻipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōkoʻa - Poʻipū - Kalāheo districts), water use in 2035 is projected to be 3,24 GPD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā'ulepū Surface
Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching

To provide perspective, nutrient inputs from the adjacent Kūloa-Po'ipū region were also calculated. Nitrogen input to the marine environment in the Po'ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Resource Consultants, Inc. (MRCI). Surface water from the Waipōlī Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team and the environmental agencies. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua’i community.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūle‘epā will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

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This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawaii\'s Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Russell Faraldi
3116 Poipu Road
Koloa, HI 96756
arthaus@roadrunner.com

Subject: Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice

Kaua‘i, Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-09:001:001 portion

Dear Russell Faraldi:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhūulepu‘e Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 21, 2015, described the proposed pasture-based rotational grazing system
as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency is designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows' manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF's intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd's diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastural rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow's diet. Additional project-specific trials at the Måhāʻulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided from the farm from Wa‘ia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word "nutrients." Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Måhāʻulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of...
699 mature dairy cows at the Māhā'ulepū site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian is available to prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

NATURAL HAZARDS: The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhā'ulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai‘i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone. The Kaua‘i and Ni‘ihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands.

Although they occur infrequently, Kaua‘i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhā'ulepū region during and following the hurricanes that affected Kaua‘i in 1992 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class B under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhā'ulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua‘i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in theDraft EIS Section 4.6.2.

FLORA AND FAUNA: Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs or national property. EIS Sections 49 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing plant species. The survey also investigated the presence of plants currently listed as endangered, threatened, or proposed for listing under Federal or the State of Hawai‘i’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plant species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhā'ulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat seabirds that nest in upland areas of Kaua‘i overfly the site. The endangered Hawaiian goose, nēnē, was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject.
property. It is probable that some nest on or adjacent to the site as this species nests in the general Kōloa area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to project specified areas, marking tall structures and fencing with white visibility polytype, limiting nighttime lighting, and shading any outside lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 410.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

INVERTEBRATE SPECIES: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā'ulepū area, as well as the parasites and predators on site that control these species. Fieldwork was conducted during September 15-16, 2014. The entire study is included in Draft Environmental Impact Statement (EIS) as Appendix B.

CAVE AND LAVA TUBE INVERTEBRATES

There are no known caves or lava tubes found at or adjacent to the dairy farm property. The Kōloa Lava Tube System, which provides habitat for two endemic cave species, the Kaua‘i Cave Wolf Spider and the Kaua‘i Cave amphipod, is located several miles away from the dairy farm property. Both invertebrates are listed as endangered under the U.S. Endangered Species Act. Not all cases in the Kōloa area contain these invertebrates, as many do not contain the optimal climatological conditions required by these organisms. Neither the botanical and faunal survey nor the invertebrate survey revealed any evidence of lava tubes or caves on the property, and no such features have been reported for the area near the Hawai‘i Dairy Farms (HDF) site. Thus no cave invertebrate species will be affected by the dairy farm.

INTRODUCED PREDATOR INSECTS

An invertebrate study of manure-associated insects was conducted for the Draft EIS. The study included a field survey that used manure from an adjacent beef cattle herd as a lure, and determined flies and other manure-related insects currently present at the HDF site. Pest insects such as flies can negatively impact livestock health and production, and are therefore actively managed to prevent stress and loss of productivity at dairy operations.

At the HDF site, two common flies were identified: the stable fly and the horn fly. Both of these flies are widespread throughout the Hawaiian Islands. The greenbottle fly was reared from manure taken back to a laboratory following the field survey. Additionally, flies known to exist on Kaua‘i but not seen at the HDF site during the survey were identified and include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations.

In response to cattle-related insect pests, numerous species known to compete with the pests were introduced to Hawai‘i between 1898 and 1982. Twenty species of predators and competitors to the horn fly were successfully established during that period. Cattle egrets break up dung patties while searching for prey, and were introduced to Hawai‘i in the late 1950s to control cattle-associated insects. Extensive introduction of dung beetle species resulted in 16 dung beetle species becoming established on Kaua‘i.

A healthy population of dung beetles can bury a dung patty in one to three days, which disrupts reproduction of flies such as the stable fly and horn fly. The stable fly requires approximately 21 days within the dung patty for the immature life stage (egg to pupa) to survive; the horn fly takes 10 to 20 days from egg to adult. Incorporation of the manure into the soil profile by dung beetles removes the habitat these flies require to complete their lifecycle. Research shows that 95 percent fewer horn flies emerged from dung patties containing a dung beetle species that has been identified at the HDF site. Proven control methods for the stable fly include parasitic micro-wasps and spreading out manure.

Among the invertebrates previously introduced to Hawai‘i to combat livestock-related flies are extremely tiny parasitic wasps that prey on various fly species. The adult wasps could be described as the size of gnats. Using an ovipositor – described by lay people as a “stinger” – the female lays eggs in the larva or pupa of flies. The male wasp has no such “stinger”. See Draft EIS Section 4.11 for a photo providing scale for these tiny, non-stinging wasps.

To minimize potential establishment of pest flies or other insects, food waste generated during the construction phase will be bagged, covered, contained and disposed of in order to limit possible breeding habitat for flies. Inspections of building materials for ants or other insects will be conducted to prevent introduction of new pests to the HDF site. Short-term controls, including mechanical methods (e.g. sticky tapes or ribbons in the milking parlor, or traps with or without attractants) and chemical methods may be used to prevent short-term spikes in pest populations.

Insecticides and herbicides are non-discriminatory and kill beneficial as well as pest insects. Beneficial insects include primary decomposers such as earthworms and dung beetles, and pollinators including bees. Should chemical control be needed for short-term spikes in pest populations, application would be by those qualified, and in accordance with regulatory labeling requirements. HDF will implement long-term...
integrated pest management, which utilizes knowledge of the ancient food web among species by disrupting the manure habitat required to complete the fly life cycle. HDF and other ranchers on Kaua‘i may choose to engage with the State Department of Agriculture to translocation dung beetle species already introduced on Kaua‘i to Māhūʻulepū and other areas where manure-related flies may be a problem.

IMPACT OF SPRAYS ON BEES

Beneficial insects include primary decomposers such as earthworms and dung beetles, and pollinators including bees. Honey bees are an essential part of any agricultural ecosystem, and were observed on site during the invertebrate species survey. Pesticides and herbicides can reduce populations of beneficial insects, which is why HDF will utilize an integrated pest management approach.

It is expected that honey bees will visit water sources set up for the HDF herd. Preventative measures will be built into any open water source to prevent bees from being trapped, and HDF will contact local beekeepers for advice regarding any bees or bee colonies encountered on site. Safe application practices for any unavoidable herbicide or pesticide will be utilized in order to narrowly target the correct pest species without harming other insects and animals in the area. Anyone using herbicides or pesticides will be properly trained and informed, and if a honey bee colony location appears to be a danger to workers or cattle, or to be in danger itself, a local beekeeper will be contacted for advice and removal.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment associated with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 12 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to ongoing dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,219,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total) versus $68,000 for the committed herd size. The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Nāpali formation lavas of the Waimea volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprohite, a soft, thoroughly decomposed rock. The Māhūʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa...
The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water**: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring**: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium and in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand**: The adjacent, developed Kōloa-Poipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i region (the Kōloa-Poipū-Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāulepū Road. This ditch, named Waiopōlō Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction**: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and
prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makuawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāulepū Valley. The deme canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and that it is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, US Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fenceline and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 1.62 tons DM per acre to 20 tons DM per acre. Section 423 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kāhā-Mi’ipu‘u region were also calculated. Nitrogen input to the marine environment in the Po‘ipu region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 14 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipu region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.
The minor contributions of nutrients from episodic rainfall anticipated to occur just
10 days annually from dairy operations will not adversely affect ocean water quality
and the marine environment. The nearshore area is a highly mixed environment
which actively disperses inputs within several meters from shore. Comparing
nutrient constituents in surface water samples taken from the HDF site and the
agricultural ditches down gradient to nutrients sampled in the nearshore ocean
water revealed that indicator bacteria were substantially lower in the ocean than in
the ditch. The rapid decrease is likely a result of both physical mixing of water
masses and toxicity from saline water. In any event, the elevated levels of indicator
bacteria do not extend beyond the shoreline. Baseline water quality data and the
surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality
monitoring will be instituted in conjunction with the surface water quality
monitoring to regularly sample and analyze the nearshore ocean waters. The
ongoing testing program will provide feedback to the dairy management team to
help ensure that nutrients and bacteriological constituents are not being released at
levels of environmental concern. Data from the nearshore water monitoring
program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i
community.

This response letter accompanies your copy of the Draft Environmental Impact
Statement (EIS). The Draft EIS is available on the OEQC website at the following
URL search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

February 20, 2015

State of Hawai‘i

Department of Health

1250 Punchbowl Street

Honolulu, HI 96813

RE: EIS – Hawaii Dairy Farm

I am writing to ask about several concerns to be evaluated as part of the EIS to the Hawaii Farms Dairy.

My first concern is the lack of objectivity of Group 70 International conducting an EIS – specifically on waste management since Group 70 International created the waste management process. An independent environmental engineering firm should be evaluating the plan and any mitigations. There is certainly a conflict of interest having the developer critique its own plan.

Second, there will a substantial degradation to the entire Mauka area with a high density board. For years, local families have been allowed to hike to what is commonly known as “Hidden Beach.” This has a spectacular view along the coast line and leads to a secluded beach where many visitors and locals enjoy a quiet day.

Additionally, there are many family traditions of camping at Mauka area beach during holidays. All of these activities and way-of-life will be impacted by gated, fenced areas as well as impose odor, biting flies, and potential run-off. The dairy insists the fed lot will be zero waste. I am not convinced. The plan to liquify and spray adjacent fields as a “nutrient fertilizer” will either run off during heavy rain or seep into the ground. Such seepage is likely to reach the water table. These “sprayed” fields are at close as 750 yards from the Kolos water well and nitrate pollution to the water via contamination to the water table is a highly likely scenario as evidenced in other states recently.

Third, there have been no reports on how to mitigate biting flies. An entomologist sent Mayor Carvalho an open letter about the typical 5-mile range of such biting flies and how the flight pattern is likely in swarms. Anyone with a pond or pool will have to contend with swarms of flies which can migrate as far as five miles. This would likely impact all outdoor activities as far as Spouting Horn. All resorts such as the Hyatt, Sheraton, Kolos Laundry and shopping at Poipu Village, Kekaha‘ukai, and Spouting Horn would be affected. The National Tropical Botanical Gardens are also within the 5-mile zone of migrating flies. Quality of life would be adversely affected; the economy would also be adversely affected as the shopping areas are also outdoors. This entire issue has not been addressed.

A fourth issue is that of irrigation. Recently the State District Court ruled that a private enterprise Kaua‘i Springs did not have rights to the spring water for commercial purposes. Grove Farm has entered into an
agreement to supply water from the Waiake reservoir which reverted water rights back to Hawaiian rights after the closure of the Kolos Sugar Mill. Access to the water for use to liquify all the solid waste is using a water
source for commercial purposes. Should the legal defense through Office of Hawaiian Affairs retain rights to
the water, what source of water is proposed for the dairy?

Lastly, I personally own a home in Poipu. I am less than a mile from the Grand Hyatt. I have a fish pond
in my yard. My neighborhood is only about 2 miles downwind from the proposed site. Having grown up in
Colorado and having been around many cattle operations, I am all too familiar with both the odor and fly
problem affiliated with such large scale operations. The proposed site for the dairy operation is too close to
some of the most coveted real estate in the country. It is certainly too close to my home.

The concept for the dairy is a theory. The only other example, which HDF points to, is the New Zealand effort.
The consequences of the New Zealand effort has been disastrous and well documented. Because I value living
in Poipu and consider my home and my access to clean beaches, access to pristine waters off of the Mahahulepu
coast - integral to my quality of life- I find the proposed site for this large scale dairy to be obviously deficient
in analyzing the impact it can have on our lives here.

Mahahulepu is the wrong location for this project.

Mahalo mai loa.

Cheryl Ann Farrell

Cc: Group 70 International, Inc
925 Beshel Street, 5th Floor
Honolulu HI 96813
Hawaii Dairy Farms, LLC
PO Box 1690
Koloa HI 96756

May 26, 2016

Cheryl Ann Farrell
2598 Waho Street
Koloa, HI 96756
hearts4kauai@gmail.com

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Mahahulepu Road
Kauai, HI
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Cheryl Ann Farrell:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to
demonstrate the pasture-based system as an economically and environmentally
sustainable model for Hawaii’s Precision agricultural technology that monitors cows’
health, grass productivity, and effluent management will be used to ensure
environmental health and safety, as well as best management practices, and help
determine the ultimate carrying capacity of the land. With proven success at a herd
size of 699, HDF will contemplate the possibility of expanding the herd in the future.
For dairy operations with 700 or more mature dairy cows, additional regulatory
review and permitting by the State Department of Health is required. At the
discretion of HDF, management may choose to expand operations up to the carrying
capacity of the land, which is estimated to be up to 2,000 productive milking dairy
cows. Permit process compliance would be followed at such time HDF may decide to
pursue an expanded operation.

The following responses are offered to your comments:

GROUP 70 OBJECTIVITY: Group 70 International, Inc. (Group 70) is responsible for
the preparation and processing of the Hawai’i Dairy Farms Environmental Impact
Statement (EIS). The EIS was prepared in accordance with the requirements of
Chapter 343 Hawai’i Revised Statutes and the “Environmental Impact Statement
Rules” (Chapter 200 of Title 11, Hawai’i Administrative Rules). The environmental
planning team at Group 70 has prepared several hundred Environmental
Assessment and EIS documents over the past 40 years, and every document has
been accepted by the responsible County, State and Federal agency. On numerous
past EIS projects, the Hawai’i Chapter of the American Planning Association has
recognized Group 70’s professional work with Chapter awards for excellence in
environmental planning. Part of the EIS scoring process involves Group 70’s

GROUP 70 INTERNATIONAL
2598 Waho St. Koloa HI 96756
hearts4kauai@gmail.com
www.hearts4kauai.com
Voice: 808.652.1284 Fax: 808.742.9029

GROUP 70 INTERNATIONAL • 925 Beshel Street, 5th Floor • Honolulu, HI 96813-4307 • tel: 808.523.5866 • fax: 808.523.5874 • www.group70int.com
The pastoral rotational-grazing dairy provides a local feedstock - grass - as the herd's primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially identified sufficient yield and nutrition to supply 70 percent of the herd's primary food source, the existing environmental conditions, probable impacts with mitigation, and identifying appropriate varieties of grass. Additional project-specific trials have identified sufficient yield and nutrition to supply 70 percent of the herd's primary food source.

The rotational-grazing method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and known as "mobs," mimic the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The cows' primary nutrition source and minimizes stress to the animals. Cows tend to be very precise application of irrigation and/or diluted effluent on the pasture. The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through the pivot irrigation systems or through gun irrigation. Irrigation water supply is provided from Wai Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The term "grass-fed" was used in the HDF EIS. This term was used to identify any cow or calf being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways through the site. Seeding of grasses begins with the establishment of the existing vegetation in the setbacks. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. HDF's intent to use a locally-applied feedstock - grass - for more than 70 percent of the dairy herd's diet is a narrow legal definition of grass-fed, and is not in the revised EIS. The term "grass-fed" is no longer used in HDF's Draft EIS for any dairy operations. Due to the evolving definition of grass-fed, the term is not used in this EIS.
irrigation water. Nutrient management is the practice of managing the amount, rate, and timing of nutrient application to ensure effective plant uptake, soil management, and environmental protection. Nutrient management involves the use of fertilizers, crop rotation, and other practices to optimize nutrient use and minimize nutrient losses.

The HDF site includes the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could contribute to the growth of pest populations, particularly in the absence of effective sanitation practices. The timing and application of nutrients will correspond with plant uptake, soil properties, and nutrient management strategies. Appropriate nutrient management practices will be implemented to prevent and control nutrient loss without compromising plant productivity. A full list of site management measures is provided in the Draft EIS.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It is estimated that the storage period will be less than 30 days, and the effluent is planned for application every 45 days, to ensure that the ponds are kept at manageable levels. During the calves' initial 90 days, they will be transitioned to pasture at the HDF site.

The potential impacts of the Hawaiian Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS) completed in April 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

Demographic and Economic: The potential economic impacts of the Hawaiian Dairy Farms (HDF) on the existing economy were evaluated in the Draft Environmental Impact Statement (EIS) completed in April 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

Flies were identified on the HDF site using manure from neighboring livestock as bait. Flies were identified as the house fly, the latter known for causing disease in livestock. Various species of flies are present at the HDF site, including the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could contribute to the growth of pest populations, particularly in the absence of effective sanitation practices. The timing and application of nutrients will correspond with plant uptake, soil properties, and nutrient management strategies. Appropriate nutrient management practices will be implemented to prevent and control nutrient loss without compromising plant productivity. A full list of site management measures is provided in the Draft EIS.

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be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawaii Island), approximately 10 percent of Hawaii’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 12 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36.7 million pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawaii.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawaii Dairies Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāulepū Valley and the HDF site ranges from 105 – 500 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD) of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaii’s Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.85 MGD). These demands are a small fraction of the 3 MGD
produced by the on-site, existing Māhūulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhūulepū 14 well and the County's Kolōa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhūulepū Valley, HDF established a 1,000-foot setback surrounding the Kolōa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kolōa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kolōa - Po‘ipū - Kalīheo districts), water use in 2035 is projected to be 3,244 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water: The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhūulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhūulepū watershed.

The HDF site is located on the bottom-land of the upper Māhūulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhūulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure to disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makuwahine Care Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhūulepū Surface Water Hydrologic Unit as the remote areas are on private lands. Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a ‘Sanitary Survey’ of the Māhūulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhūulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations: Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or
maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhō`ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on a episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po`ipū region were also calculated. Nitrogen input to the marine environment in the Po`ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po`ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipoli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua`i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai`i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the
DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m3, well below the State standard of 150 μg/m3. The estimated concentration for PM2.5 is 0.23 μg/m3, well below the Federal standard of 35 μg/m3 (see Draft EIS Section 4.19 and Table 4.19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to lesser than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

ALTERNATIVES:

As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed project. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision.
alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to produce more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
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- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Aloha Bill and staff ~ you may use any or all of my enclosed testimony for TGI.

I’m sending the following to State of Hawaii, HDF@Group 70int.com; epo@doh.hawaii.gov, as recommended in today’s TGI.

Others too? Council? Mayor? email addresses?

Mahalo,

Alan

Comments re Hawaii Dairy Farms

Does HDF want to consider relocating their eventual 2,000 dairy cow herd NOW, before having to move it later? The history of milking cow dairy’s on Kauai is one of relocating here and there until they all moved off the Island of Kauai.

Starting back in around 1905, Mr. HP Faye started the Waiamea Dairy as a part of his Waimea Sugar Mill Co. His in-laws had a dairy in Moloa’a prior to his marriage. He suggested to the Lindsay family, that they relocate their dairy to Waimea; which they did. Over the many years, Waimea Dairy flourished through the late 1960’s when the milk was delivered by milkmen as far as Hanalei on the North Shore of Kauai. The dairy herd was about 278 milking cows.

As a young teenager, through high school, I worked many “dairy” hours. We mulched sugar cane tops and mixed this with pine-apple bran skins that were dried. We even picked keawe-tree beans, as school kids during World War II for ten cents a burlap bag! There was no “milk-flo” feed coming during the War. Keawe-tree beans kept cows cleaner, along with sugar-cane tops and pineapple bran.

Waimea Dairy was always very careful about cleanliness of the cows, pastures and pasteurizing plant. Near the end of 1969, the Faye family faced a required major expense to update the pasteurizing plant. The decision was made to accept an offer from MeadowGold Milk Co. of Honolulu. They would buy the herd, take over operations, and lease the facilities.

All went well until MeadowGold stopped control of nauseous odor and biting flies. MeadowGold Milk Co. closed operations and Kikiaola Land Co. then owned the Waimea Dairy facility. After Hurricane Iniki, Kikiaola converted the many sugar plantation homes into the Waiamea Plantation Cottages. Now came the problem of dairy causing a problem with guests at the Waiamea Plantation Cottages; a resort. Kind of like HDF being near the Hyatt Resort, hey?

As a result, Kikiaola evicted MeadowGold, who then moved their dairy to Moloa’a; not to process milk, but to produce milk from the cow herd and send to Honolulu for processing and selling. It was not very long that the local residents of Moloa’a manage to evict MeadowGold, claiming bad odors and dirty run-off that polluted Moloa’a Bay.

This begs the question: Why not relocate the HDF NOW? There are many parcels that should not result in eventual eviction. Example: Kahili Mountain area. This location is away from residential complainers and business ventures. The special New Zealand grass will flourish there. The higher the elevation, the better the growth. The soil is more porous and less likely to generate major run-offs.

Surely with Mr. Case and his 16,000 acres of former Grove Farm lands, can find a more suitable location that is still “ag” than historical Mahu‘ulepu. I rest my case.

Alan Faye, Princeville 808-826-7630  Feb 23, 2015
Dear Alan Faye:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISP) published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob”, mimicking the natural social order of herds. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways, and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and grass footpaths are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the
other partner ranches as needed for animal health and dairy productivity. This will help ensure a healthier and longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

Of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers will be utilized as a resource, it is being used for the constituent components that provide the potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunamis, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 1% annual chance-floodplain. The proposed location for the farm is not known to experience flooding conditions. The area has experienced two earthquakes originating further south in the Hawaiian Islands. Although they occur infrequently, Kaua'i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management practices in the proposed location for the farm are designed to minimize environmental impact due to agriculture and livestock waste. The area lies within the tsunami evacuation zone. The Kaua'i and Ni'ihau region of the Hawaiian Islands is located within FEMA Zone X, areas determined to be outside the 1% annual chance-floodplain.

Preparation for the potential impacts of natural hazards is not known to experience flooding conditions. The area has experienced two earthquakes originating further south in the Hawaiian Islands. Although they occur infrequently, Kaua'i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management practices in the proposed location for the farm are designed to minimize environmental impact due to agriculture and livestock waste. The area lies within the tsunami evacuation zone. The Kaua'i and Ni'ihau region of the Hawaiian Islands is located within FEMA Zone X, areas determined to be outside the 1% annual chance-floodplain.

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regulatory requirements, with containment in excess of the major rainfall events recorded on Kauai over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawaii Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōkua area was built by Napali formation lavas of the Waimale volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhū‘ulepi Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōkua series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhū‘ulepi Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōkua-Poi’ipi’i region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhū‘ulepi may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaii Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhū‘ulepi 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhū‘ulepi 14 well and the County’s Kōkua F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhū‘ulepi Valley, HDF established a 1,000-foot setback surrounding the Kōkua F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kauai community.

Regional Water Demand: The adjacent, developed Kōkua-Poi’ipi’i region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kauai will increase county-wide by 17,300 residents by 2030. The South Kauai population is estimated to reach 16,855 in 2035, when it is projected to
encompass 19.2 percent of the County population. For the South Kaua’i region (the Kōlia- Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hā’upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery.

Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua’i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however; DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part 1 of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Graz yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three
times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Puʻipū region were also calculated. Nitrogen input to the marine environment in the Puʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Puʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment.** An assessment of groundwater and surface water interaction with the marine water downstream from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipōli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kauaʻi community.

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odors. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaiʻi has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

**DUST**

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kauaʻi and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM2.5 is 2.01 μg/m3, well below the State standard of 150 μg/m3. The estimated concentration for PM10 is
The DEIS evaluates alternatives that could attain the objectives of the action's purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua'i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).

The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3).

However, after years of trying, it appears there was limited interest in such a venture.

Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai'i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai'i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai'i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua'i, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawaii Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
February 17, 2015

Laura McIntyre  
State of Hawaii, Department of Health  
1250 Punchbowl Street  
Honolulu, HI 96813

Group 70 International, INC.  
925 Bethel Street, 5th Floor  
Honolulu, HI 96813

Jeff Overton  
Hawaii Dairy Farms, LLC  
P.O. Box 160  
Koloa, HI 96756-1990

Bridget Harrerquil  
Friends of Maha’ulepu  
PO Box 1654  
Koloa, HI 96756

Gentlemen,

I have been coming to the Poipu area of Kauai with my family for over 40 years. Sixteen years ago I purchased a house at Poipu Kai which I gave to my daughters two years ago. The house is rented when we are not in Hawaii, we pay our fair share of state and local taxes. I am very alarmed by the proposal to start an industrial dairy at Maha’ulepu.

The HDF proposal does not address the public health consequences of polluting the aquifer that we all depend on, or the expected rise in respiratory illness that accompany industrial dairies. It does not address the accidental importation of invasive species with the cattle and their food. It does not address the loss of one of the most scenic areas of the Island, the down stream consequences of a rainstorm like 2006 which caused one of the dams on the island to fail, or another storm like Iwa or Iniki.

Economically, the upside profitability of the Maha’ulepu dairy is questionable given that the owners of one of the largest dairies in Idaho, Steve Whitesides who boasts in the local Rupert paper that he has 14,000 cattle in his herd, has an industrial dairy operation on the Hanakua Coast 30 miles from Hilo where his Big Island Dairy produces 15,000 gallons of milk a day. Why not 14,000 cattle here too?
In summary, I think the proposed industrial dairy at Maha'ulepu is a bad idea.

Sincerely,

James M. Ferguson, MD

Susan J. Ferguson

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Cow Country: The Rise of the CAFO in Idaho

As mega-dairies and feedlots make up more of Idaho’s dairy industry, the conflicts between people and cattle are increasing

By Scott Weaver

On a quiet June day, Dave Diment looked out from his front porch at a field of grass washing in the wind. Diment lives on and farms a patch of land in the Magic Valley just north of Jerome. A small, but significant, farm is located close to the former Japanese Internment camp where the National Park Service is building a memorial.

Diment, in any measure, an enormous man, with long, sun-soaked hands that exude power in a handshake. He makes his living growing hay and corn for the dairies that populate this area where he has lived nearly all of his life. It’s a good place for this kind of farming. Three counties in the Magic Valley—Jerome, Custer, and Twin Falls—have the highest concentration of dairies in the state.

So you wouldn’t expect Diment—a self-described staunch Republican—to side with a movement to slow and even stop the expansion of large dairies. But as he looks over the field just feet from his back door, the contradiction begins to make sense.

Over the last two decades, the vision of a dairy has morphed from an idyllic setting to an industrialized, high-tech feedlot—factory farms. This is one of the concentrated animal feeding operations. The process of economies of scale, dairies and feedlots grow into expansive operations able to hold tens of thousands of animals.

The nearest field is more than a mile away, but you could toss a rock from the porch into its stalls. It belongs to South View Dairy, which has had trouble finding a site to open its new 5,000-head feedlot on 60 acres one mile upwind of Minooka and next to Diment’s farm.

There are a lot of good dairyman out there,” said Diment. “This dairy industry has been really good for this area. There are some that try to take care of their neighbors. But these guys just want to come in and build this mega-facility.”

The fight over South View became an embattlement that Jerome Sheriff David Hinds used natural selection to search the public for a weapon for the hearing. During the hearing, a woman was led by a bull by the courtroom after refusing to yield the floor to the county commission chairman.

In many ways, South View is emblematic of what former Jerome County Commissioner Daria Orman recently called a shift in public attitudes about CAFOs in their county.

While the dairy and beef industries are revenue generators for counties and financial bettholders for the state and the 10th-leading producer of milk and dairy products in the nation, many who live and work near CAFOs diminish the physical and environmental landscape are fighting for their property rights and better regulations of operations. And to make their voices heard.

“We all have cows. We all understand them,” Diment said. “But these things need to be located out in the middle. They can’t affect your people. These guys came in and wanted to put it right on top of us.

During the 1980s, an exodus of dairies from California reshaped Idaho. By 1997, income from dairy products exceeded those from the state’s signature crop, potatoes. The next year, dairy outpaced both potatoes and beef. Dairy operations fleeing California’s regulations found in Idaho a state with space and a welcoming attitude.

But the boom didn’t translate into more dairies. Between 1990 and 2007, the number of dairies dropped from 1,952 to 648. During the same period, the amount of milk produced skyrocketed from just less than 3 billion pounds to 11 billion pounds.

What was once an industry of small farmers has become dependent on CAFOs. The average herd size increased from 20 cattle in 1990 to 763 in 2007. The decrease in dairies coupled with the increase in herd sizes puts more animals in fewer concentrated areas.

CAFO’s environmental impacts are evident. During 1,000-plus cows in a confined space produces an enormous amount of animal waste that often contains high levels of nutrients, pesticides and pharmaceuticals, if not properly handled, it can leak into surface and ground water. According to a 2008 paper in Environmental Health Perspectives, this happens all too often.

“Based on available data, generally accepted livestock waste management practices do not adequately or effectively protect water resources from contamination with excessive nutrients, microbial pathogens and pharmaceuticals present in waste.”

The Idaho Department of Environmental Quality has found increasing levels of nitrogen in areas heavily populated with CAFOs. These levels are caused by fertilizer applications—including spraying of liquid manure onto fields—and agricultural activities of confined animal feeding operations. High nitrate levels in water can cause brain damage in infants and has been associated with reproductive problems and cancer, according to researchers at Colorado State University.

According to the EQC, nitrate is a concern because more than 95 percent of Idaho’s drinking water comes from groundwater. The Magic Valley and its CAFOs sit on the Eastern Snake River Plain, the only source of drinking water for 200,000 people in Southern Idaho.

Cow Country: The Rise of the CAFD in Idaho | As mega-daileks and...hoarse people and cattle are licensoring | Features | Boise Weekly
2/17/15, 10:29 AM

STILL, residents were only able to submit a portion of the documents they wanted because of the tight deadlines and short notification.

Roughly 25 homes around the dairy are on wells or underground. Many who live them, in homes built before the dairy moved in, are fed economically to the dairies of Treasure County, whether they work for them or supply them with things like feed.

That a dairy wanted to expand in an area already concentrated with CAFDs was a concern. But that the dairy was the Ted Miller Dairy was another issue. Just one of the 243 dairy CAFDs in Idaho, the Ted Miller Dairy has a curious story.

It began in 1969/1970 in C Bar, a high-bred dairy owned by Greg Sibbett, who became Idaho’s state veterinarian in 2005—and his wife, Jane, ISDA records show five dairies or non-compliances in the past 10 years, a violation of the rules governing dairy CAFDs. In 2001 a permit was issued; and in 2003 the dairy experienced water from its fountain on a country road. These types of violations usually result in a larger problem—a much more water and not enough storage capacity.

But the most egregious dairy case came in 2008, when a C Bar M hurricane was large enough that buildings (located from one to five miles from directly to the Black River. C Bar M was sent $3,800 by the Environmental Protection Agency.

This was the only time that C Bar M had been fined for an illegal discharge, while ISDA had previously fined the dairy for failing to locate more than 100 calves against deadlocks, it has never been a fine against a dairies for the dairy’s numerous non-compliances.

After the DPA files, C Bar M changed its name to the Ted Miller Dairy.  

Multiple calls to the member listed for the Ted Miller Dairy were not answered.

At the late-morning public hearing, most of the people who live near the dairy spoke against the expansion. According to Jacob, the only people in favor of the expansion were Ted Miller employees and the dairy’s lawyers.

"There’s really nobody here who is anti-dairy, saying CAFDs should be eliminated," Jacob said. "They’re for people making money. People need to make money, but they need to do things in a manner that’s legal,” and in a manner that’s going to make a sustainable dairy.

Almost all of the people interviewed for this story agree on one thing: Idaho needs to raise its dairy. The majority make their living from agriculture and are astounded about the fact that most operate their farms to raise their families and working with neighbors.

Bernard Farms is one such operator. He tells roughly 95 cows and walks 60 to 70. Because the cows are kept in an open lot, or corral, it’s classified as a CAFD. Because of its small herd size, Bernard Farms doesn’t have a major impact on the water. Instead, it composts manure during the summer and fall.

"Everyone I talk to in the dairy industry tries to do the right things," said Steve Barrall. "We try to talk to our neighbors and make sure everything is going well with them, that we’re not a nuisance to anyone."

Barrall said that his irrigation equipment sprays the dirt road the farm shares with a neighbor, creating noise, he will come back and grade the road.

Meanwhile, many of Ted Miller Dairy’s neighbors have had to spend $1,500 to $8,000 to re-drill wells because of the growing water use, Jacob said.

He finally felt the impact of living close to so many CAFDs more personally and profoundly. But moving away from a CAFD is a complicated and money-losing proposition. CAFDs and their small-scale, dust, noise and tills are all on the list. Making matters worse, there is a huge financial cost, a huge economic cost.

Johnstone Road in Treasure County is just as rocky as the mountains that serve as its backdrop. Countless trucks and tracks have taken their toll. Half-burned county roads, built up by the constant and heavy traffic missing animals and waste, are a reality of living near CAFDs.

When I first met Helen Kettles, she’s trimming the branches of trees that line the dirt path from Johnstone to the farm. A retired DIT, Kettles’ face shows the years she’s spent under the sun, riding horses and working her farm.

"I thought I’d be farm hands," she said later as we walked out toward the property line she shares with Wilkie Fendall, a 6/100-head kitten replacement CAFD. Kettles and her then-husband bought the land in 1979 and built the house where she lives in 1985.

A barn separates Kettles property from Wilkie. Whether the dirt of size, manure and rocks constitutes a barn has been a contentious source of debate and quickening arguments for years. On top of the barn sits two parallel railings left by the CAFDs’ owner. They are not Dischmann school-adolescents.

Just across the bordered fence from the barn, hundreds of feet. Like the CAFDs from the Shit Town, manure is scattered nearly 100 feet high. The pigs—"cow condo" in the vernacular—are so large that some keepers leave on their touring, surrounding themselves.

For more than four years, Kettles tried to sell for place after a series of incidents with the Ted Miller Dairy. After Wilkie’s water and manure fouled her property in 2005, a conditional use permit issued by Treasure County required Wilkie to build an engineered fence to keep water from the property line.

The nature of the thing that situating the fence line is debatable. It’s essentially a fence line of dirt and gravel remote to keep water from running 30 feet from the cow pens onto Kettles property. Whether an engineer designed the fence is also debatable.

Then there are the toilets. They appeared after Kettles complained to Southwest District Health that Wilkie employees had been dumping the toilets and defecating on her property.

According to both Kettles and Allen Hesse, where the two were walking along the fence and taking pictures of the toilets, the owner had been told and threatened to take Hesse’s camera from him. Both women left shaken.

"You think of the worst person, the term makes you think friendly or caring about another human being," Kettles said. "This is certainly not them, and I wouldn’t call them neighbors."

When asked if e-mail the toilets, barn and relationship with the farm’s neighbors, a Wilkie representative, who repeatedly declined to be named, sent her this two-sentence statement:

"The lease is approved, meets required government specifications and has never failed, and any claims otherwise are incorrect. We adhere to, and are in compliance with, all State and Federal mandates and state environmental regulations."

The representative did not answer questions about the toilets.

After the Site 1999 disputes, Kettles, and Wilkie paid less than $1,000 for a new well pump and it’s time to plant along the property line. Wilkie was also fined $9,000 by ISDA, but only past $50 of the fine, the rest went into abeyance, to be levied in the future if necessary. Dakey said that holding the majority of fines in abeyance is "not an uncommon practice."

"An illegal tree doesn’t do anything to protect the neighbor from future discharge," said Dakey. "But if there’s $4,500 in looming penalty money, they need to get it done."

While that may be true, in Cattle’s case, there’s the issue of the barn. It needed to be installed by Dec. 31, 2005, by NRCS standards and approved by ISDA. On the day that United Kettle in early April, rather than these things had been done. Two weeks later, when inspected by ISDA officials, the barn had been approved, even though there were never any evidence of engineering documents.

Why did it take five years for ISDA to approve the barn while holding the majority of Wilke’s fine in abeyance?

"I don’t have a good answer for that," said Van Matz, the chief of the ISDA Dairy and Egg bureau. "I think there was some confusion."

Back in Treasure County, the Kettles are still waiting to see if they’ll be next to a CAFD. If South Valley is built, the Kettles aren’t sure if they’ll be able to stay in their home of 12 years.

"I just don’t think I’d want to live in this house," he said, sitting at the kitchen table, a glass pitcher of pink lemonade his wife Eden just made in front of him, unfolded. "I know it’s not huge and fancy, but it’s ours."

In the other room, a boy, maybe 3 or 4 years old, wakes up from a nap on the couch. His father’s voice is breath and was born premature. The Kettle pediatrician told them that they can’t live next to anything like a CAFD. His lungs couldn’t handle it.

"If it goes in," said Eden with a sigh, "nobody would want to buy our house. But we can’t live here."

**CORRECTION:** The C Bar M dairy began operations in 1880, not 1980, as the story previously reported. It changed its name to the Ted Miller Dairy in 2003.

**Related Stories**

**Dairy Kings?**

"It is rare and strange and ultimately inappropriate for a regulated entity to have a meaningful interest in understanding the regulation."

—Cassidy Stour

**Whatta Gonna Do With All That Poo?**

by Rachel Dallag

**Water Contamination Likely the Result of Shit. Go Figure.**

by Rachel Dallag

**Idaho is Full of Shit**

by Rachel Dallag

**Mail and Memorial September 15, 2010**

"The same gang that wreaked the whole world's economy and left us hopeless were wont back."

**Mail and Memorial Sept. 8, 2010**

Quote of the Week: "I also fixed this article regulation and fled with lies."

**Note: I Know You Are, But What Am I?**

Looking at this week's main feature, it looks like it’s an excuse of last year's debate—name-calling in the comments section come Tuesday.

**BW took a shit tour. Then wrote about it.**

This is the week we're going to get serious about shit. Animal shit, specifically, for Rachel Dallag.

**COMMENTS** (22)

Sort: Oldest to Newest

| Sort | Oldest to Newest |  |  |

**Jeez, you didn’t have to go to Magic Valley to take the shit tour, just go to Happy Valley and Greenbush on a nice summer evening. Welcome to Stanley Town (Hampa).**

**report**

I like, I dislike it


Page 4 of 10


Page 5 of 10
formation exhibit extensive weathering which may extend to considerable depths - as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS examined whether the two waterbodies within Māhāʻulepū Valley might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**POTABLE WATER:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai'i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County's Kōloa F well, will result in no adverse impacts to ongoing use of
groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well. Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhūʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kīloa Fowell in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kauaʻi community.

**Regional Water Demand:** The adjacent, developed Kōkoʻa-Poʻipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kauaʻi will increase county-wide by 17,300 residents by 2030. The South Kauaʻi population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kauaʻi region (the Kōkoʻa-Poʻipū-Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhūʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhūʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhūʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhūʻulepū Road. This ditch, named Waiopīli Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment log around drain inlets.

**Surface Water Quality:** The Kauaʻi Chapter of the Surfrider Foundation began collecting water samples in Waiopīli Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopīli Ditch, or of surface waters in the Māhūʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopīli Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhūʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopīli Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopīli Ditch Sanitary Survey, Kauaʻi, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhūʻulepū Valley. The ditch runs along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopīli Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to
create filter strips that could capture particulates during stormwater runoff events. Waioli Ditch provides the majority of freshwater input to the immediate coastal zone and marine environment. The mouth area is highly eroded, forming a meandering channel with some alluvial deposits within the Ditch itself. With the help of the USGS, the creeks drain into the Ditch and have been sampled for bacteria and nutrient levels. Nutrients from Waioli Ditch are transported to the nearshore ocean, which is protected by the coral reef. The bacteria and nutrient levels in the Ditch are monitored daily, ensuring that nutrient concentrations are not above the background levels. As a result, the EIS provides an excellent assessment of the water quality impacts of the project on the nearshore ocean. The groundwater and surface water analysis conducted for the Environmental Impact Statement (EIS) is included in the Draft EIS as Appendix F.
DUST
Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylot” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM<sub>10</sub> and PM<sub>2.5</sub>) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM<sub>10</sub> is 2.01 μg/m<sup>3</sup>, well below the State standard of 150 μg/m<sup>3</sup>. The estimated concentration for PM<sub>2.5</sub> is 0.23 μg/m<sup>3</sup>, well below the Federal standard of 35 μg/m<sup>3</sup> (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR
Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Collin Fleming & Kim Factor:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai'i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhāʻulepū Valley on the island of Kauai to produce fresh, locally available nutritious milk for Hawai'i families. The rotational-grazing method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a "zero-discharge, grass-fed dairy." The term "zero-discharge" under the U.S.
Environmental Protection Agency related to concentrated feeding operations. States. As not noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to groundwater and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow herd to operate at capacity, especially given the evolving definition of "grass-fed". The term in not used in this EIS.

Agricultural infrastructure and utilities required for the dairy operations, and drainage improvements: The irrigation system and distribution of livestock water ef fluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 dairy cows, and over 60 days of storage for the committed 699-cow herd. The effluent storage ponds are designed to accommodate 30 days of storage for up to 2,000 dairy cows, and over 60 days of storage for the committed 699-cow herd. The effluent storage ponds are designed to accommodate 30 days of storage for up to 2,000 dairy cows, and over 60 days of storage for the committed 699-cow herd. The effluent storage ponds are designed to accommodate 30 days of storage for up to 2,000 dairy cows, and over 60 days of storage for the committed 699-cow herd.
Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. Licensed veterinarians may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plachy Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawaii‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (367,198,700 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22, and 4.23; the technical reports are in Appendixes E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimānalo volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhū‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The
material. The alluvial material blanketing the valley floor is less permeable than the groundwater in the deep aquifer were documented. Future monitoring will allow unweathered volcanics by orders of magnitude. Hydraulic conductivity represents comparison between conditions prior to, and during, HDF operations. Results from the ability of soils to transport water given a hydraulic gradient, and is expressed in the monitoring program will be shared with the Department of Health Clean Water units of feet per day. It is a measure of how easily water will move within the project's growth and water demand anticipated in the region through 2055.

**SURFACE WATER**

**Regional Water Demand:**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Mānāiki Deep Surface Water Hydrologic Unit, which features relatively high precipitation with relatively slow movement through the HP site across the valley floor, and meets a concrete ditch that parallels the West Ridge. These normally dry streams converge into man-made channels running towards the north.

Replenishment from Construction: The dairy facility and associated infrastructure will be constructed on a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural and non-structural erosion control measures; minimizing dust generation; and implementing sediment collection in key locations and storage facilities.

**Surface Water Quality:** The Ka‘au Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi.
Collin Fleming & Kim Factor
May 26, 2016
Page 9 of 15

Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The deme canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Library" (http://health.hawaii.gov/cwb.).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35 feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageway; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

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Impact to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient concentrations in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water
masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua’i community.

TRAFFIC: The Draft Environmental Impact Statement (EIS) Section 4.18 and 4.25 includes an evaluation of roadways and traffic conditions, along with potential impacts of the dairy farm construction and operation. Primary access to the site is via Māhāʻulepū Road, a two-way, two-lane road, which is accessible from Koloa Road (Highway 530) via Ala Kinoiki Road. Within the project area, there is a network of unimproved private agriculture haul roads that provide access to and from Māhāʻulepū Road.

Roadways in the project area operate smoothly with no periods of heavy traffic. On average, traffic in the region is much lower than urban areas in the state due to the low population of Kaua’i and rural agricultural demographics of the south Kaua’i area and Māhāʻulepū. Traffic on Māhāʻulepū Road consists of agricultural vehicles, residential and resort/visitor traffic.

During construction, the proposed project is not expected to have a significant short term impact on traffic operations in the project vicinity. Additional traffic will be generated during construction, but will return to normal levels after project completion during day-to-day operations. There will be no change to traffic patterns or infrastructure related to the public roads.

Traffic operations along Māhāʻulepū Road and the surrounding County roads are expected to continue to operate at acceptable levels of service during peak hours of traffic. The projected increase in vehicle movements related to HDF operations for the committed herd size of 699 cows would include 5 daily employees accessing the site, milk tanker and supply trucks every two days, and truck with stock trailer, for a total of 12 additional vehicle trips per day. Daily traffic along Ala Kinoiki Road and Koloa Road was 8,000 and 6,500 cars daily. HDF-related traffic would add less than one percent additional trips. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area.

At a contemplated herd size of up to 2,000 cows, an additional 11 vehicle trips per day would access the HDF site, for a total of 23 vehicle trips daily. Projections for daily vehicle movements in 2035 for Ala Kinoiki Road and Koloa Road are 7,200 and 9,500 daily vehicles. HDF-related traffic would add less than one percent. These additional trips would have an minimal effect on traffic conditions at County roadways in the surrounding area. Traffic data is presented in the Draft EIS Sections 4.18 and 4.24.

Construction equipment mobilization will comply with Hawai’i’s Department of Transportation and County requirements. Delivery trucks and milk tanker trucks will be in compliance with State and County size and weight limits; no oversized vehicles will be used for ongoing operations.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai’i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy operations include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua’i and the total concentration was compared to the State ambient
air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM$_{10}$ is 0.21 μg/m$^3$, well below the State standard of 150 μg/m$^3$. The estimated concentration for PM$_{2.5}$ is 0.23 μg/m$^3$, well below the Federal standard of 35 μg/m$^3$ (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be detectable. By creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year; within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

**ALTERNATIVES**

As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawaii Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. These alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawaii, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow
local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).

- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3).

- However, after years of trying, it appears there was limited interest in such a venture.

- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 6) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
As any entomologist will confirm, one fly lays a minimum of 300 eggs and they prefer warm wet manure. The types that develop in manure are horn flies, stable flies, deer flies and horseflies; all piercing sucking flies that exist on blood. Our frequent rains will greatly increase the proliferation and these insects can fly up to 4 miles from the HDF site. Within a few months, there will be billions of flies. The EIS must offer proof that this will not happen. Please hire the best environmental entomologist available for your study. We also need to know the facts as to how the HDF will control run off. Gravity operates at even a small pitch (especially over clay soil) and this land is only 65 feet above sea level. Although the proposed sloping the land to the ditches could encourage control of the run off, you are really just passing it to the Waipii stream which runs to the ocean. In a few years it will have polluted all the beaches along the south shore. In addition, how you will reduce the Nitrates in the water and the methane gas contribution to our fragile Ozone layer.

The overall probable long-term impact of allowing HDF to go into production is as follows:

- There will be no more eating on our lanais, thriving outdoor restaurants or picnics on the beach.
- Bankruptcy of restaurants, businesses and condos will follow.
- Unemployment will be rampant as the economy of the entire island gradually dies from loss of jobs related to the loss of our profitable Visitor Industry.

In return HDF will provide maybe a dozen "filthy jobs". Certainly that is not an acceptable trade off.

As I stated earlier, HDF is a bad idea for the proposed Mahalalepu location and I'm an objectively conducted EIS will bear that out.

Sincerely,

Karl Forer
1939 Haelekaana St.
Lihue, HI 96766
Dear Karl Forer:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhū‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a "zero-discharge, grass-fed dairy". The term "zero-discharge" as used by the U.S. Environmental Protection Agency related to concentrated feeding operations (CARE) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term "zero-discharge" as it was construed as no nutrients into the system.

The term "grass-fed" was used in the HDF EISPN. This term was used to identify HDF's intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd's diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of "grass-fed". The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of "grass-fed", the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area "footprint" will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient "dry matter" grass yields essential to a cow's diet. Additional project-specific trials at the Māhū‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows' diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as "mobs", mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period grazing on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows' primary nutrition source and minimizes stress to the animals. Cows tend to be...
Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of animal health protocols and monitored for treatment of illnesses. Alternative treatment of illness may precipitate use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of bovine illnesses and ensure the herd’s well-being. A pooled testing of milk from cows for laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for off-site herd management, refer to Section 3.7 of the Draft EIS.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigation systems. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The NRCS Conservation Practice Standard 590, Nutrient Management, applies to dairy. Throughout the less than 30-day storage period, effluent is planned for use at least once every three days and application is spread at least once every seven days. The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,500 mature dairy cows, and over 85 days of storage for mature dairy cows. The menus contain of 2,000-dairy cows, and during the cold period up to 3,000-dairy cows are fed. HDF will prevent and control fly population growth through diligent cleanup and sanitary practices regarding any trash and food waste, as well as through efficient manure management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The timing and application of nutrients will correspond with plant uptake, soil properties, and weather conditions. For more information on nutrient balance and planning, refer to EIS-Section 3.5, and Draft EIS-Appendix D.

A study of invertébrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes presence or absence of native species or pest associated with cattle and livestock. Invertébrate species were noted in the survey of the site. A full report and list of invertébrates species observed on the HDF site are provided in Section 4.11 of the Draft EIS. The project location does not provide any habitat for drosophila, or stable flies. A full report of the study is located in the high-elevation koa-forest.

The horn fly, the latter known for biting cattle, is an important insect to minimize fly-breeding habitat in nature. In the drosophila, two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are not noted in the survey of the site. A full report and list of invertébrate species noted in the survey of the site are provided in Section 4.11 of the Draft EIS. The project location does not provide any habitat for drosophila, or stable flies. A full report of the study is located in the high-elevation koa-forest.

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Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will be facilitated by the dairy and other methods including moving cattle to and from the Dairy.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizer, organic fertilizer, cattle manure, and animal waste. Nutrient management is the practice of managing the amount, rate, timing, and placement of plant nutrients and soil amendments.

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manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pads in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōloa-Po'ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ah Kinoiki Road between Kōloa and Po'ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animals wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai'i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofer, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua'i, and 8 on O'ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment associated with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua'i.

The HDF project would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai'i Island), approximately 10 percent of Hawai'i's milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua'i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O'ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai'i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua'i, and 2 indirect jobs on O'ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua'i and another 8 indirect jobs on O'ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area's hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waima volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepi Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the
unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhūʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poʻipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two water bodies within Māhūʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaiʻi Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhūʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and will not remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhūʻulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhūʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhūʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poʻipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two water bodies within Māhūʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

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**Regional Water Demand:** The adjacent, developed Kōloa-Poʻipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kauaʻi will increase county-wide by 17,300 residents by 2030. The South Kauaʻi region is projected to encompass 19.2 percent of the County population. For the South Kauaʻi region (the Kōloa - Poʻipū - Kalaehe districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhūʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhūʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhūʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hāʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhūʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery.

Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kauaʻi Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to evaluate the data.
to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Mâhâulepú Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a Sanitary Survey of the Mâhâulepú and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Mâhâulepú Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the tops of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Efficient Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Mâhâulepú will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major to fall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kūloa-Po’ipū region were also calculated. Nitrogen input to the marine environment in the Po’ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po’ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment:** An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator
bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impairment report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EBS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours— in two separate milking cycles—moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical application. No State or Federal regulations for greenhouse gas emissions from farm operation units in residential areas. Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within a area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odor winds from east to west would be less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.
GREENHOUSE GASSES: Draft Environmental Impact Statement (EIS) Sections 4.19 and 4.26 address the potential for greenhouse gas emissions by Hawai'i Dairy Farms (HDF). Estimates of GHG emission rates from a pasture-based dairy, including methane and nitrous oxide, were calculated using the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories. Parameters for Oceanic dairy cattle in warm climates were selected as most applicable to conditions at HDF. Long-term operational impacts were modeled using the IPCC guidelines and conversions, and estimated the emissions potential for GHG at the dairy at the committed herd size of 699 milking cows to be 2,693 CO2e metric tons per year. This equates to roughly 1.02 percent of the utility power generation sector on Kauai in 2013, which does not include vehicle emissions and other GHG emitters on the island.

Potential GHG emissions for HDF at the contemplated herd size of up to 2,000 milking cows was modeled as described in Section 4.19.3 using the IPCC guidelines and conversions. The estimated total of 7,702 CO2e metric tons per year (8,490 tons) is 5,009 CO2e metric tons (5,521 tons) greater than the committed herd size of 699 milking cows. This equates to an increase equivalent to 1.91 percent of GHG produced on Kauai for power generation by the utility in 2013 (Hawaii Island Utilities, 2013). Power generation does not include vehicle emissions and other GHG emitters on the island.

While the presence of cows may increase GHG, a long-term beneficial impact of the grazing fields is the sequestration of carbon as CO2 captured by the process of photosynthesis by the grass. According to recent studies in the Soil Science Society of America Journal, converting formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, which enhances soil quality, grass production, and has the potential to offset up to one-third the annual increase in CO2 production on an area.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawaii's Dairy Farms", http://tiger.unl.edu/OEQC/11A1

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Margery Freeman
freemanmargery@gmail.com
Subject: Hawai‘i Dairy Farms

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

The following responses are offered to your comments:

SOILS: Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during dryer periods, to filter and buffer potential pollutants from leaching fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawai‘i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

SOIL conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soil Resource Report for Island of Kaua‘i, Hawai‘i.” The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalihi Clay at 32 percent, Ke‘ena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, calcium, magnesium, organic matter, salinity, micronutrients, and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline for runoff and infiltration conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawai‘i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

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As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai‘i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

ARCHAEOLOGICAL AND CULTURAL:

The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPDD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising, given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic era cultural materials associated with the many Land Commission Awards in the project area were non-existent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhā‘ulepū Ahupu‘a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully endorsed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

NOISE:

Existing noise conditions of the project site and the surrounding Māhā‘ulepū valley area are evaluated in the Draft Environmental Impact Statement (EIS), along with anticipated short-term and long-term noise conditions associated with the dairy farm and planned mitigation actions. Draft EIS Section 4.12 addresses noise conditions.

Noise can be defined as unwanted sound, a sound that is considered loud or unpleasant, and/or sound that causes disturbance. Research related to noise and livestock focuses on noise levels and minimization of unexpected sounds that cause undue stress on cows. Noise stress results in loss of livestock productivity and thereby financial loss to farmers and ranchers. Little research exists on the sound levels from livestock.

Sound is measured in decibels (dB). The State of Hawai‘i Department of Health (DOH) rules use the A-weighting sound network (DIA) in the HAR §11-46, Community Noise Control. Sound through the air is similar to ripples on a pond of water. In open space without reflection, ripples spread uniformly in all directions and decrease in amplitude further from the source. In free field conditions such as outdoors, amplitude drops by half as distance doubles (OSHA, 2016). When sound passes close to absorbing ground cover such as grassland and fields, the “soft ground” absorbs extra sound as it passes. The Hawai‘i Dairy Farms (HDF) site in Māhā‘ulepū Valley is approximately 2 miles from the resort area, and 1.5 miles from the closest residential areas (on land zoned for agriculture). Typical noise currently generated near the HDF site includes truck ingress/egress along private farm roads, agricultural equipment, and cattle and sheep.

Construction work at the project site will involve activities that may generate an increase in noise levels. However, such exposures will be a short-term condition, occurring during daylight hours. Construction vehicles and activities must comply with DOH Administrative Rules. DOH noise control regulation requires a permit for construction activities that emit noise in excess of 78 decibels or that cost a total of more than $250,000. Mitigation measures to minimize construction noise will...
include the use of mufflers to suppress loud equipment and limitations on the hours of heavy equipment operation.

The dairy farm will utilize milking equipment contained in the milking parlor, and will use field equipment such as tractors. Under HAR §11-46, agriculture is classified as Zoning District Class C, which specifies maximum permissible sound levels of 70 dBA in the daytime and 70 dBA at nighttime. Dairy operations will generate noise in keeping with agricultural zoning of the parcel. The primary noise receptors in the area would be farmers working nearby parcels. Noise from the dairy will not exceed the DOH threshold, and will not contribute to excessive noise in the region.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai’i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production, the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area’s hydrology is shaped by its geology. The Kūloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā’ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary remnants of the Kūloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the...
ground. The hydraulic conductivity of the alluvium that underlies Māhā'ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōkō-Poʻipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two water bodies within Māhā'ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā'ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā'ulepū 14 well and the County’s Kōkō F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā'ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōkō F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment log around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.
recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CBW to conduct a "Sanitary Survey" of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CBW noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Library" (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create water strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downstream from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively dispenses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.
Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be initiated in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CBWL dairy neighbors and the local Kaua‘i community.

TRAFFIC: The Draft Environmental Impact Statement (EIS) Section 4.18 and 4.25 includes an evaluation of roadways and traffic conditions, along with potential impacts of the dairy farm construction and operation. Primary access to the site is via Māhāʻulepū Road, a two-way, two-lane road, which is accessible from Kōloa Road (Highway 530) via Ala Kinoiki Road. Within the project area, there is a network of unimproved private agriculture haul roads that provide access to and from Māhāʻulepū Road.

Roadways in the project area operate smoothly with no periods of heavy traffic. On average, traffic in the region is much lower than urban areas in the state due to the low population of Kaua‘i and rural agricultural demographics of the south Kaua‘i area and Māhāʻulepū. Traffic on Māhāʻulepū Road consists of agricultural vehicles, residential and resort/visitor traffic.

During construction, the proposed project is not expected to have a significant short term impact on traffic operations in the project vicinity. Additional traffic will be generated during construction, but will return to normal levels after project completion during day-to-day operations. There will be no change to traffic patterns or infrastructure related to the public roads.

Traffic operations along Māhāʻulepū Road and the surrounding County roads are expected to continue to operate at acceptable levels of service during peak hours of traffic. The projected increase in vehicle movements related to HDF operations for the committed herd size of 699 cows would include 5 daily employees accessing the site, milk tanker and supply trucks every two days, and truck with stock trailer, for a total of 12 additional vehicle trips per day. Daily traffic along Ala Kinoiki Road and Kōloa Road was 8,000 and 6,500 cars daily. HDF-related traffic would add less than one percent additional trips. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area.

At a contemplated herd size of up to 2,000 cows, an additional 11 vehicle trips per day would access the HDF site, for a total of 23 vehicle trips daily. Projections for daily vehicle movements in 2035 for Ala Kinoiki Road and Kōloa Road are 7,200 and 9,500 daily vehicles. HDF-related traffic would add less than one percent. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area. Traffic data is presented in the Draft EIS Sections 4.18 and 4.24.

Construction equipment mobilization will comply with Hawai‘i Department of Transportation and County requirements. Delivery trucks and milk tanker trucks will be in compliance with State and County size and weight limits; no oversized vehicles will be used for ongoing operations.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odors. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farming operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day. Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions. Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kaua‘i and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM2.5 is 0.61 μg/m³, well below the State standard of 15 μg/m³.
is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawaii Dairy Farms”: http://tinyurl.com/OKCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Feb. 10, 2015 56.

Group 70 International, Inc.
925 Bethel St., 5th Floor
Honolulu, HI 96813

Re: EISP - Hawaii Dairy Farm

Mahā'ulepu. The place name evokes fondest memories. Since discovering this pristine spot on a guided walk with Mahama Mahā'ulepu President, Beryl Balish in 2006, Kaua'i's last undeveloped watershed has been the "special hike" we've taken with family and friends. Everyone recognizes immediately its spectacular beauty; preserving its rare character is naturally a topic of our conversations.

Now we're learning about Wai'opili Stream pollutants from Dr. Carl Berg's water tests, confirmed and retesting done currently by Hawaii State Dept of Health. And that Hawaii Dairy Farms (HDF) wants to install a dairy farm on this land of not only priceless beauty but of historically significant archeological sites — holualoa burial, petroglyphs, tide pools, salt beds — and cultural practices performed to this day. Several visits to Makauwahi Cave Reserve greatly inspires Mahā'ulepu's protection.

Kyle Datta, general partner Ulupono Initiative states the dairy's purpose is "to produce fresh, local milk for families across Hawaii State at prices everyone can afford" and that the dairy "will strengthen the ability of the agricultural sector to continue to provide meaningful jobs and valuable economic support for Kaua'i." Highly debatable.

In my opinion, the strengths of Kaua'i are our Environment — clean Air, clean Water, clean Land, clean Ocean — and the Spirit of our Citizenry. Environmental degradation continually takes place from chemical sprays, fuels, exhaust, landfills, poor practices such as discarding plastics and nets in the sea, the presence of people and animals, and so forth.

I oppose HDF's dairy plan. Collective manure calculations, clay soils allowing manure/urine run-off into the vital land and surrounding sea are recipes for disaster. Hawaii State Dept of Health should fear well-water contamination. Dr. Katherine Muzik, Marine Biologist, told me her dive in waters off Mahā'ulepu revealed a gorgeous living coral, large as a car. How long will our land and seas sustain viability with constant cow mess run-off? We cannot keep compromising our environment with unchecked development after unchecked development.

HDF plans copious water withdrawals from the Waipoua Reservoir. That must not be allowed to happen. Water belongs to everyone per our Hawaii State Supreme Court.

And the odoriferous stink! No one wants to smell a dairy farm, not even residents or visitors. Think reduced residential and business property values. Think residents suffering (if they can) and leaving; think visitors flying elsewhere.

Flies. They always accompany cows. HDF plans to keep importation, a foolish if not absurd idea. Dealing with a negative with another negative results in two (2) negatives. Example: importation of guinea grass to feed earlier livestock has resulted in island-wide, invasion or that crisis.
May 26, 2016

Sharon Goodwin
PO Box 446
Kapa’a, HI 96746

sharonmokihana@gmail.com

Subject: Hawai’i’s Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā’ulepū Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Sharon Goodwin:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

ARCHAEOLOGICAL AND CULTURAL: The Hawai’i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-294. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with prehistoric and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic-era cultural materials associated with the many Land Commission Awards in the project area were nonexistent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhā’ulepū Ahupua‘a, and has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā’ulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the
HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila musaphilila, the only Kauai species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-ʻōhiʻa forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawaii for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhā‘ukū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pads in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōloa-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ae Kinoiki Road between Kōloa and Po‘ipū, and it is probable that livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animals wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawaii’s Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk will be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawaii’s Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement.
Groundwater

Hydrology: The area's hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimānalo volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā'ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā'ulepū Valley and the HDF site ranges from 1.05 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day.

Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā'ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai’i Department of Health Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā'ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā'ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā'ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua’i community.

Regional Water Demand: The adjacent, developed Kōloa-Poipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DREDT) projects the population of Kaua’i will increase county-wide by 17,300 residents by 2030. The South Kaua’i population is estimated to reach 16,855 in 2035, when it is projected to encompass 192 percent of the County population. For the South Kaua’i region (the Kōloa - Poipū – Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā'ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā'ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā'ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the ʻHaʻupu...
Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and area upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” [here](http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that can capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-PO‘ipu region were also calculated. Nitrogen input to the marine environment in the PO‘ipu region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater
and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipu region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring. Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kauai' community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odor and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. ES sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day. Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kauai¹ and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

ODOR emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy feeders and effluent ponds were adopted to reflect the HDF facilities.

ODOR emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of
panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1.670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaii’s Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

From: Yojana <soundhealing.kauai@gmail.com>
Sent: Friday, February 20, 2015 7:51 PM
To: epo@doh.hawaii.gov; HDF
Subject: Questions and Concerns Re EIS for HDF

Group 70 International Inc.
Attn: HDF a Project
Honolulu, HI 96813

Hawaii State Dept of Health
environmental Planning Office
Honolulu, HI. 96914

To whom it may concern:

MAHA’ULEPU is a living museum with its diverse ecologies, endangered species and cultural sites. It is imperative that the E.I.S. process acknowledges that there may be many more discoveries yet to be unveiled. How can these be protected and managed? Recent findings by HDF of petroglyph rocks and heiau are examples of this. Please address protection issues for any existing cultural artifacts such as petroglyph rocks and heiau and the ability of the Native practitioners to be able to continue their practices.

The type of soil in the valley is particularly suited for Kalo cultivation. Surely the run off from the proposed Dairy will impact the existing soil preventing production of Kalo or anything else in the future? How will run off affect the quality of the soil and the Former Salt Pans which can be restored?

Will there be percolation tests conducted? Ground water and surface water contamination is of major concern as the high water table is down from the dairy site. The valley floor is subject to flooding, the possible impacts of run off, spillage etc into the aquifer and ocean must be determined. Waiopli stream cannot afford more pollution and the impacts on the health of beach goers, as well as the oceans, reefs, fishing and endangered sea creatures could be dire. How is this being assessed?

Will a hydrology study be conducted to include both Maha’ulepu and Pa’a?

How will the odors and flies be controlled? Using chemicals and introducing other species to ameliorate flies could result in more environmental and pollution problems.

There are endangered species existing in the valley itself how will these be protected?

The flies, odor and degradation of the beaches would have severe economic and health impacts on the South shore community and visitor industry. Already there are less visitor bookings for 2016 due to the possible Dairy. There are thousands of people whose livelihoods depend upon the visitor industry whereas the Dairy will be employing very few. Please explain how this can be good for our community.

Hawaiians had sustainable ag without milk. Milk is well known to not be good for human consumption. If the milk is shipped off island to be processed how is this sustainable ag and where is the economic validity in such a process? Who is going to make money?
How will the dairy operations impact the local roads? Will more roads need to be built? What are the traffic implications on already congested roads? Will more roads be built in the Valley? If so how will this impact the environment?

What are the implications of the island wide increased bovine populations on our island as a whole?

How can this EIS be non biased with Group 70 as the provider?

This is a Sacred Place please let’s treat it with the respect it deserves and do everything that can be done to ensure that there is no damage to this area.

Thank you for your consideration.

Yojana Grace
P.O. Box 1551
KOLOA, HI 96756

May 26, 2016

Yojana Grace
P.O. Box 1551
Koloa, HI 96756
soundhealing.kauai@gmail.com

Subject: Hawai’i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i

Dear Yojana Grace:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

GROUP 70 OBVIOUSLY:

Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai‘i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai‘i Revised Statutes and the “Environmental Impact Statement Rules” (Chapter 200 of Title 11, Hawai‘i Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State and Federal agency. On numerous past EIS projects, the Hawai‘i Chapter of the American Planning Association has recognized Group 70’s professional work with Chapter awards for excellence in environmental planning. Part of the EIS scoping process involves Group 70’s
growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as "poorly drained", and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure fertilizer. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen, phosphorus, calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas "drainage" refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential for impacts on waterbodies. In this way, "poorly drained" soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than "well drained" soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai’i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

NATURAL HAZARDS: The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhūale’ip property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai’i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone. The Kaua’i and Niihau region of the Hawaiian Islands...
has experienced tremors from earthquakes originating further south in the island chain and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs of the potential cultural resources, practices or beliefs of Native Hawaiian people. The cultural assessment concluded that no adverse effect would be expected from the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The sixteenth historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the affected Kauai sites are located along the proposed project line. Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and are located within or along the established survey area. Only one of the sites is believed to be associated with prehistoric or early historic times. State Site 50-30-102398, the agricultural heiau, and State Site 50-30-102399, a carved petroglyph boulder, are all located outside of the project area.

Preparedness is the best protection for natural disasters. Structural design of dairy structures is necessary, as explored through survey and subsurface exploration. The project will be fully covered and enclosed by perimeter fencing along the boundary of the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and C.

An emergency preparedness plan for protection of animals has been prepared for both the dairy site and surrounding area. The emergency plan also includes provisions for protection of the dairy project and animal health. The plan includes procedures for evacuation, containment, and control of any disease outbreak. The plan is designed to ensure that animals are protected and that the project is not impacted during any disease outbreak.

Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the Site 50-30-102398. The sites are located along the northern boundary of the proposed project, Site 50-30-102398 and Site 50-30-102399, are located outside of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and are located within or along the established survey area. Only one of the sites is believed to be associated with prehistoric or early historic times. State Site 50-30-102398, the agricultural heiau, and Site 50-30-102399, a carved petroglyph boulder, are all located outside of the project area.
Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are plants that occur or could survive if planted, native plants will be used in the stabilization. HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests No long-term impacts to native plant habitats or endangered or threatened plants species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species list. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhā'ulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kauai may overfly the site. The endangered Hawaiian goose, nēnē was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kōoa area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to protect specified areas, marking tall structures and fencing with white visibility polystyrene, limiting nighttime lighting, and shading any outside lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roosts within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

**PESTS:** A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarized the presence or absence of native species or pest species associated with cattle manure in the general Māhā'ulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i’s Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plauché Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.
The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include technical consultants conducted field studies and analysis on water quality:

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā'ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā’ulepū Valley and the HDF site ranges from 10.5 – 500 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipu region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

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The groundwater and surface water analysis conducted for this Draft EIS examined whether the two waterbodies within Māhā’ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational, at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk
Rules require that potable water be used for milk production, both in the milking parlors and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōkā F well, will result in no adverse impact to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot distance between the Kōkā F well is agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōlā-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōlā - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 3,242 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off the south slope of the Hā‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Economic Development and Tourism (DBEDT) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either marine recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent waterheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library”. (http://health.hawaii.gov/cwb)
TRAFFIC: The Draft Environmental Impact Statement (EIS) Section 4.18 and 4.25 includes an evaluation of roadways and traffic conditions, along with potential impacts of the dairy farm construction and operation. Primary access to the site along Highway 530 via Koa Road. Within the project area, there is a network of unimproved private agriculture haul roads that provide access to and from the ditch. The rapid decrease is likely a result of physical mixing of water and nutrient inputs in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that extends to the ditch. The rapid decrease is likely a result of physical mixing of water and nutrient inputs in accordance with best management practices.

The minor contributions of nutrients from episodic rainfall are anticipated to occur just 10 days annually from dairy operations, which would be conducted during such weather events. Establishments of buffer and pasture grasses, keeping nutrient applications away from streambanks, will be established. Nutrient applied in the nearshore water monitoring program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern.

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area and Māhā‘ulepū. Traffic on Māhā‘ulepū Road consists of agricultural vehicles, residential and resort visitor traffic.

During construction, the proposed project is not expected to have a significant short term impact on traffic operations in the project vicinity. Additional traffic will be generated during construction, but will return to normal levels after project completion during day-to-day operations. There will be no change to traffic patterns or infrastructure related to the public roads.

Traffic operations along Māhā‘ulepū Road and the surrounding County roads are expected to continue to operate at acceptable levels of service during peak hours of traffic. The projected increase in vehicle movements related to HDF operations for the committed herd size of 699 cows would include 5 daily employees accessing the site, milk tanker and supply trucks every two days, and truck with stock trailer, for a total of 12 additional vehicle trips per day. Daily traffic along Ala Kinoiki Road and Köloa Road was 8,000 and 6,500 cars daily. HDF-related traffic would add less than one percent additional trips. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area.

At a contemplated herd size of up to 2,000 cows, an additional 11 vehicle trips per day would access the HDF site, for a total of 23 vehicle trips daily. Projections for daily vehicle movements in 2035 for Ala Kinoiki Road and Köloa Road are 7,200 and 9,500 daily vehicles. HDF-related traffic would add less than one percent. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area. Traffic data is presented in the Draft EIS Sections 4.18 and 4.24.

Construction equipment mobilization will comply with Hawai‘i Department of Transportation and County requirements. Delivery trucks and milk tanker trucks will be in compliance with State and County size and weight limits; no oversized vehicles will be used for ongoing operations.

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. ER sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

**Clean Air Act**

Under the **Clean Air Act of 1970** (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own *State Ambient Air Quality Standards (SAAQS)* that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄; from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

**DUST**

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kau‘a‘i and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.
Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odor would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaii Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

February 19, 2015

Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, HI 96813

To Whom It May Concern:

I am writing as a concerned citizen and business owner in Poipu, Kauai that would be greatly affected by the proposed Hawaii Dairy Farm site near the coastline of Mala‘ulepu. Should a dairy farm be allowed to put cows near an already contaminated stream it could not only affect the marine life in our small community, but our island’s entire economy. Our main source of income for the island is tourism.

The proposed dairy site is on one of the most pristine destinations on our island with historical significance and the home to endangered species. I personally live in the area that would be affected by the constant smell of feces and flies as do the majority of my employees. My husband and I also own a vacation rental management company with the majority of our properties in the Poipu area. I can say for certain that NO ONE will want to stay in Poipu if they have to endure that kind of environment. They will go to Maui or perhaps not even come to Hawaii at all.

As a licensed real estate broker on Kauai I know that our overall property values will also be greatly diminished.

I strongly urge you to oppose the construction of a commercial dairy farm at Mala‘ulepu.

Sincerely,

Amy Grant, R
May 26, 2016

Amy Grant
P.O. Box 98
Koloa, HI 96756

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā'ulepū Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001: 001 portion

Dear Amy Grant:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $60,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E...
and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

Though this study was intended for local use, the results could be significant for similar projects. The shallow groundwater body in the alluvium, which lies in the lower portion of the valley, is the source of potable water. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths. The alluvial material blanketing the valley floor is less permeable than the Parent material. The alluvial material at depth, which is the source of potable water, is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

GROUND WATER

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the dairy and the groundwater in the alluvial layer, which is the source of potable water, will result in no adverse impacts to ongoing use of groundwater in the alluvial layer. Therefore, water movement through soils under the proposed dairy site is 10 times lower than the nearby agricultural area.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater and the alluvial surface water in the shallow aquifer within the alluvium are documented in Table 1. Future groundwater monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department.

Potable Water: Once fully operational, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater and surface water. Should HDF decide, in the future, to expand to the contemplated 2,000 mature dairy cows, the dairy will utilize 50,000 gallons per day (gpd) which is 0.05 million gallons per day (MGD), of potable (drinking water quality) water from groundwater and surface water. The State Department of Land and Natural Resources, Commission on Water Resources, and the Hawaii Department of Health, DoH, will be involved in the review of HDF’s application to use off-site water resources. HDF has a formal agreement with the University of Hawaii to use their lab facilities for groundwater analysis, and has explored the possibility of using their lab facilities for surface water quality analysis.
through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery.

Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and a area upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The demo canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Library" (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainage way (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The nitrogen fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 423 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater
and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipu region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipio Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua'i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were evaluated, and currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai'i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua'i, and the total concentration was compared to the State ambient air quality standards. Only the contoured herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-192).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adopted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of
panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 240 hours, or 44 hours per year, within an area that extends approximately 1,670 feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai’i Dairy Farms”: http://tqurl.com/050CKAUA

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AEP, LEED AP
Principal Planner
formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kīlauea series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhūle‘upā Valley and the HDF site ranges from 105 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhūle‘upā may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhūle‘upā 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhūle‘upā 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of...
Groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhūʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kīloa Fowell in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kauaʻi community.

Regional Water Demand: The adjacent, developed Kōā-Poʻipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kauaʻi will increase county-wide by 17,300 residents by 2030. The South Kauaʻi population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kauaʻi region (the Kōā - Poʻipū - Kalåheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhūʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhūʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhūʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhūʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kauaʻi Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data; however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhūʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhūʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator bacteria levels found in ditches running through Māhūʻulepū Valley. The ditch confluence at the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

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**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūʻalepā will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment.** An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipōlī Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occur rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively dispenses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kauaʻi community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawaii Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Kathleen Hadwin:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai'i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā'ulepū Valley on the island of Kaua'i to produce fresh, locally available nutritious milk for Hawai'i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system.
The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system. Instead, the term “hydrostatically designed” has been used in the document. The term “hydrostatically designed” is defined as a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the nutrients in the water and any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. The irrigation water supply is provided to the farm from Waiola Reservoir, and will be filtered and pumped to the various irrigation component parts on the farm. The irrigation water is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pastures will be managed or restored to reduce erosion, improve stability of ditch banks, and increase net carbon storage, and improve and maintain water quality. The practice of irrigation and/or effluent application on the pastures is supported by utility and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

The pastoral rotational-grazing dairy provides a local feedstock—grass—as the herd's primary food source. Reducing imported feedstocks and providing a local food source closer to the natural diet of cows stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in defining the practice of rotational grazing for the proposed dairy operation. The results of these trials were instrumental in defining the practice of rotational grazing for the proposed dairy operation. The committed herd size of 500 mature dairy cows will be highly unlikely that the storage pond will be full at any time for the contemplated 2,600-cow dairy and nearly impossible for the committed 600-cow dairy operation. Every 45 days, to ensure that the pond is kept at manageable levels.

The irrigation system will be designed to not discharge pollutants into waters of the United States. The irrigation system and distribution of livestock water will include storage tanks and labor-efficient storage ponds. In the event of the storage pond being full, excess water is planned for discharge into the nearest drainage ditch every 45 days. Irrigation water is provided to the farm from Waiola Reservoir. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The value of the practice of irrigation and/or effluent application on the pastures is supported by utility and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.
699 mature dairy cows at the Māhūʻalepū site applies to mature dairy cows. Cattle in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

NATURAL HAZARDS: The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhūʻulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai‘i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone. The Kaua‘i and Ni‘ihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands.

Although they occur infrequently, Kaua‘i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhūʻulepū region during and following the hurricanes that affected Kaua‘i in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhūʻulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua‘i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhūʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhūʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.
The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and potable water in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po‘ipi‘i region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa-Po‘ipi‘i-Kīhei districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hā‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Care Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch near the bridge accessing Makauwahi Care Reserve and the State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa-Po‘ipi‘i-Kīhei districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.
within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā'ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices. HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The nutricler run-off from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā'ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent per year, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīlōa-Po'ipū region were also calculated. Nitrogen input to the marine environment in the Po'ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occur rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to the nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at
levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH OWR, dairy neighbors and the local Kaua'i community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

To Whom it May Concern:

I’m writing to express my opposition to the dairy farm proposed in the Maha‘ulepu Valley as it is currently structured. While I appreciate the intention of promoting sustainable food practices for Kauai, I don’t feel a dairy of the size proposed is appropriate for this special island. I won’t go into all the reasons for opposing this operation...I know you have heard them from people more knowledgeable and eloquent than I...but I did want to participate in letting my concerns be known to those in decision-making positions!

Please take great care and consideration in determining if and how this plan should go forward. Kauai is an extremely unique gem on this planet and I do believe it can be a shining example to the world of how sustainability can be done RIGHT (and preferably organically, in my humble opinion). Please don’t just green-wash with all the right words; truly examine all the motives behind your decisions and do the right thing.

Mahalo for your time and consideration,

Beth Hagan
Dear Beth Hagan:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrient source and minimizes stress to the animals. Cows tend to be

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Beth Hagan  
May 26, 2016  
Page 2 of 4
healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCs provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawaii is the parenthetical inclusion of the word "nutrients." Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua'i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāʻulepū site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rHST or rBGH.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai’i Dairy Farms”:

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Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
To Whom it May Concern,

I'm writing to express my opposition to the proposed dairy farm at Maha'ulepu. It seems to me that if the goal is to do something sustainable, the amount of cattle on the land is truly more of a gamble than sustainable. If you want to do something agricultural (and cattle and agriculture are two different things) with an ecologically minimal impacts, why not do something with native plants and do it organically?

Let's think very, very long term.

Sincerely,

Pat Hagan
CAFO is a system designed to capture and store nutrient resources from manure and waste liquids in the production of livestock. CAFOs are subject to federal and state regulations designed to control nutrient discharges into surface waters. However, nutrients would be introduced to the HDF site with any use of the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through the ground and surface waters. The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of streams and ditches, the majority of the pastures will be irrigated with non-potable water and/or diluted effluent. Irrigation systems are designed to filter and pumped to the various irrigation systems on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on different pastures.

Agriculture (USDA) Marketing Survey created a narrow legal definition of "grass-fed". Due to the evolving definition of "grass-fed", the term is not used in this EIS. The pastoral rotational-grazing dairy provides a local feedstock - grass – as the herd's primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient dry matter grass yields required to support cows. Additional project objectives include conducting research to identify pasture-based model allows cows to move about freely, and to lie down and rest outdoors in natural light and fresh air. The gently sloped paddocks, walkways, and cow races are designed to provide a comfortable path under hoof. The gently sloped paddocks, walkways, and cow races are designed to provide a comfortable path under hoof.

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The principal potential impacts posed to the five endangered species include those described in DEIS Section 4.10.2.

**ALTERNATIVES:**

The DEIS evaluates alternatives that could attain the objectives of the action's purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, the DEIS examines the environmental impacts of implementing each alternative in its intended manner and location, including the proposed dairy project.

Four possible land uses that would not meet the project purpose are discussed. Reforesting the land to support the development of an Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

**Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing flora and fauna of the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting. This survey included identifying any species listed as endangered, threatened, or of special concern or potential concern. The survey results are included in the draft EIS.

A survey was also conducted to establish baseline data on the presence of plants currently listed as endangered, threatened, or of special concern within the boundaries of the project area. The survey results are included in the draft EIS.

Avian and mammalian surveys were conducted in August 2014 by Rook Biological Consulting. The surveys were conducted to identify potential threats to sensitive species. The surveys were conducted in the natural habitat, which is consistent with the site's natural setting. The surveys were conducted in the natural habitat, which is consistent with the site's natural setting.

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The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua'i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient continuous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- The alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3).
- After years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Criterion 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEOCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Ms. McIntyre:

Attached please find my letter which expresses my concerns regarding the proposed industrial dairy for the South Shore of Kauai as well as my specific comments on the EISPN.

Thank you for your review and consideration of my comments. As you know, the EISPN is a critical component of the overall EIS process and I value this opportunity to provide my input.

Sincerely,

Julie M. Hagensen
Koloa, HI
(808) 742-6688

February 22, 2015

State of Hawaii, Department of Health
Laura McIntire, Environmental Planning Office
919 Ala Moana Blvd Room 312
Honolulu, HI.

Dear Ms. McIntyre,

This letter is to express my grave concerns regarding the proposed Industrial Dairy on the South Shore of Kauai. I have owned a home in Poipu with my mother for nearly thirty years and am very familiar with site HDF proposes for their operation. I have read their materials thoroughly and have researched information concerning the many problems associated with such a large scale operation – most notably contamination of drinking water, groundwater, surface water and soils. Although effects on the environment and public health are my primary concern, I am also concerned about the economic and community impacts that the industrial dairy will have on the tourist industry, home values, cultural sites, and local business.

I have concluded that Maha’ulepu is the wrong location for such an operation and urge The Department of Health to do the right thing for the environment, the people and businesses of Kauai.

My comments on the EISPN are centered on the potential cumulative effects of an industrial dairy and the areas I feel must be addressed in the EIS.
Criteria 8: Is individually limited but cumulatively has considerable affect upon the environment or involves a commitment for larger actions.

The HDF plan is not individually limited in its effect on the environment, the economy or the social wellbeing of the community. A responsible EIS will need to address the numerous impacts on water, air and soil quality, threatened species, coral reefs and the local economy. Cumulatively, over a relatively short period of time, the HDF operation will compound the negative effects in all these areas.

The HDF plan does involve a commitment to a larger action. According to EIS requirements, any proposed action must be described in its entirety. HDF plans to begin operations with 699 cows to avoid classification as a CAFO and acknowledges plans to grow the herd to 2000 over time. Therefore the EIS must address the ultimate herd size and its management now. Questions such as composition of cows (e.g., the mix of dry and milking cows), how all animals (cows, calves, bulls) will be fed, housed, transported, slaughtered (bull calves and non-producing cows), and the management of their wastes must be addressed at the 2000 cow mark.

In addition to the growth and accumulation of pollutants as the herd size increases, other effects from greater numbers must be estimated and addressed. These include but are not limited to: noise from bawling and distress calls from cows separated from their calves which can go on 24-7 for days as well as the loud, anxious calls from cows in heat. How far will these noises carry? Data using climatic, wind and geographic conditions of the specific site must be used; Odor sources and levels from each and every aspect of the operation from lagoons and wash areas to liquefied manure that is sprayed on the land. Reports from farmers acknowledge that is takes days for the odors to subside and when it rains it begins again. On even slight slopes not only pollution and contaminants are carried off site but also accompanying foul odors. An analysis up to the 2000 cow mark must again be specific to the geography, weather and wind conditions at and near the site. How far will these odors travel on a good day? A bad day? Average wind and climatic conditions will not suffice. The impacts to soils, groundwater, streams and ocean from dairy wastes including the use of hormones, antibiotics, and vitamins must be again addressed at the 2000 head level.

HDF proposes a zero discharge operation. By its very nature, discharges to lagoons, run off from cleaning and milking operations and direct discharges from cows on sloped lands cannot be viewed as a “zero discharge” and will, together, have a cumulative impact to underground water resources, streams, ditches, beaches, and ocean below. To consider the thousands of sources of pollution from this operation as “nonpoint” is also a misnomer. For each contaminant there is a source. Obtaining a zero discharge NPDES permit is not useful in this case as it will not take into consideration the hundreds, if not thousands, of point sources of pollution that will accumulate at the site, adjacent lands, and downslope beaches, caves and ocean. As clearly demonstrated by both US EPA and citizens in the State of Washington, drinking water wells as little within a few mile from a feedlot or dairy have been contaminated over time. In the state of California, land has been declared hazardous and unusable due to years of dairy farm operation.

As noted in the DOH and Surfrider water quality samples, pollution levels in the Waipioi stream already far exceed State and Federal water quality standards. The addition of 699-2000 cows and a large scale milking operation will only compound a situation that is already detrimental to human health and the environment.

The HDF EIS must address the following cumulative effects from its operation:

1: Former uses and treatment of the land. Describe any and all former uses of the site, including adjacent lands. Provide data on current conditions of soils, flora, fauna, air and water. This is necessary to set a baseline and to monitor future cumulative effects resulting from the proposed HDF operation. Note: This must include any and all alterations to the landscape started or completed by HDF prior
to the EIS, including the permits obtained or required. It must also include the mitigation efforts HDF will take to contain, decrease, and repair accumulated pollution levels already in existence on site. Also detail how will this work will be monitored and by whom.

2. **Present uses of the HDF site and adjacent lands** -- agricultural, industrial and human related-- including the taro farm located at the bottom of the HDF site and the quarry located NW of the cave. This must include Human recreational uses such as pig hunting, hiking, and bathing. For example, HDF must explicitly outline provisions it will take to protect the taro farm from any incursions or adverse effects to the soils and food value of the crop.

3. **Future uses of the HDF site and adjacent land** should the dairy fail. Address the potential adverse effects from soil and groundwater contamination on the land that will or may limit future uses.

4. **Cumulative Weather conditions** and effects on the proposed operation. Historical data of rain fall, flooding, high winds and hurricanes must be examined in the context of reliable probabilities of flooding, runoff, destruction of buildings, paddocks and lagoons resulting in contamination of beaches below and South shores. Worst case scenarios must be described as well as impacts to human health and the environment.

5. **Cumulative Economic effects**: The EIS must address cumulative effects, over time, on property values, the tourist/hospitality industry and small businesses in the area. As noted in other locations where large dairies have operated, there will be a cumulative effect on public knowledge of odors, flies, and pollution. Perhaps initially the effect will be small but word of mouth, articles in magazines and trade journals will impact a vibrant industry that currently accounts for a large percentage of the island’s financial resources. The ripple effect could eventually affect the entire island in terms of jobs, property values and taxes, and indeed all businesses who depend on tourists for their livelihood.

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Thank you for your review and consideration of my concerns.

Julie M. Hagensen
2211 B Pane Rd
Koloa, Kauai HI 96756
Dear Julie M. Hagensen:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. Your comments were received by the State of Hawai‘i Department of Health Environmental Planning office. The Department of Health forwarded a copy of your comments to Group 70 International in order to be included in the Draft Environmental Impact Statement (EIS) analysis. This letter was prepared in response to your comments.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of...
the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF's intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “moos”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer; productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.
Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepi site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāʻulepi site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH. As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS engineering economics, wildlife biology and other disciplines to aid landowners in implementing conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices guide design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soils Resource Report for Island of Kaua‘i, Hawai‘i.” The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kāhili Clay at 32 percent, Kā‘ena Clay Brown Variant at 29 percent, and Lualua Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus calcium, magnesium, and potassium. Poorly drained soils have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential for impacts on water bodies. In this way, “poorly drained” soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than “well drained” soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai‘i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon...
The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

**NATURAL HAZARDS:** The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhā'ulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai‘i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone. The Kaua‘i and Ni‘ihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands.

Although they occur infrequently, Kaua‘i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhā'ulepū region during and following the hurricanes that affected Kaua‘i in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

**Preparedness** is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhā‘ulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua‘i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

**ARCHEOLOGICAL AND CULTURAL:** The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic era cultural materials associated with the many Land Commission Awards in the project area were nonexistent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burial, and no bone was found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhā‘ulepū Ahupua‘a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.
The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, dairy farm and planned mitigation actions. Draft EIS Section 4.12 addresses noise conditions.

Employment multipliers, indirect employment related to Dairy construction would be created on O'ahu.

Dairy will not exceed the DOH threshold, and will not contribute to excessive noise in the region.

The HDF project would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai'i Island), approximately 10 percent of Hawai'i's milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua'i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O'ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 dairy cows, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 44 million gallons (367,219,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai'i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua'i, and 2 indirect jobs on O'ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua'i and another 8 indirect jobs on O'ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.
WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimānalo volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silt and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils at the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanics series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.05 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kauai community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalalau districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface
Water Hydrologic Unit, which features relatively high precipitation with relatively low temperatures in the summer. The HDF is located on the north side of the Ha'upu Ridge, which is a natural barrier between the Ha'upu Valley and the Waiopili Ditch drainage area. The HDF is situated within the Ha'upu Valley, which is a part of the Waimea River Basin. The HDF is connected to the Waimea River Basin through the Ha'upu Valley, which is a natural drainage area for the Waimea River Basin. The HDF is located in a relatively remote area, with no significant urban development in the immediate vicinity.

The HDF is an important natural resource, providing a significant amount of water for the Waimea River Basin. The HDF is also a valuable natural resource for its biodiversity, supporting a variety of plant and animal species. The HDF is located within the Malaekahana State Park, which is a popular recreational area for hikers, mountain bikers, and other outdoor enthusiasts.

The HDF is in close proximity to several other natural resources, including the Waimea River and the Waimea Canyon. The Waimea River is an important water resource for the Waimea River Basin, providing water for irrigation, domestic, and industrial uses. The Waimea Canyon is a popular recreational area, attracting hikers, rock climbers, and other outdoor enthusiasts.

The HDF is also in close proximity to several other natural resources, including the Malaekahana State Park and the Waiopili Ditch. The Malaekahana State Park is a popular recreational area, providing opportunities for hiking, mountain biking, and other outdoor activities. The Waiopili Ditch is a man-made drainage ditch, which is used to collect and transport water from the Ha'upu Valley to the Waimea River Basin. The HDF is located within the Malaekahana State Park, which is a popular recreational area for hikers, mountain bikers, and other outdoor enthusiasts.
To provide perspective, nutrient inputs from the adjacent Kilolo-Po’ipu region were also calculated. Nitrogen input to the marine environment in the Po’ipu region is calculated to be 38,510 pounds annually, or 35 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po’ipu region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater- and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waloipili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological contaminants are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kau‘ai community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours in two separate milking cycles—a moving to and from the barn for the 15- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the site of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m3, well below the State standard of 150 μg/m3. The estimated concentration for PM2.5 is 0.23 μg/m3, well below the Federal standard of 35 μg/m3 (see Draft EIS Section 4.19 and Table 4.19).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were
applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670 feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,790 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown, it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawaii Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Aloha,

Thank you for your comments. I have forwarded them to the project consultants for review and consideration.

Mahalo,
Laura

From: vhager [mailto:vhager@msn.com]
Sent: Monday, February 09, 2015 7:34 AM
To: EPO
Subject: COW DUNG

Remember how long the Kilauea Farm smelled and only a few cows pasture in the location. My friends currently in New Zealand are sending info on devastating results of farming cows in pristine areas.

Vivian Hager

May 26, 2016

From: vhager [mailto:vhager@msn.com]
Subject: Hawai‘i Dairy Farms

Dear Vivian Hager:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhū‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations...
Cows' primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high-quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. The term "grass-fed" was used in the EIS. This term was used to identify the proposed dairy operations that could pass through ground and surface waters. The pasture rotational-grazing dairy provides a local feedstock—grass—as the herd's primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in establishing appropriate varieties of grass, and suitable sites to support sufficient dry matter grass yields essential to a cow's diet. Additional projects conducted on the 2,000-cow dairy operations will be discussed in Draft EIS Section 3.3, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock—grass—as the herd's primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in establishing appropriate varieties of grass, and suitable sites to support sufficient dry matter grass yields essential to a cow's diet. Additional projects conducted on the 2,000-cow dairy operations will be discussed in Draft EIS Section 3.3, Pasture Management.

The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the different pastures. The irrigation water supply is provided to the farm from Waiau Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5, and Draft EIS Appendix D.
other partner ranches as needed for animal health and dairy productivity. This will help boost the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds' welfare. A licensed veterinarian may prescribe the use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Wai‘ōnau volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black alaly clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day.

Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts on ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū 14 well and the County’s Kōloa F well will result in no adverse impacts on ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

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Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development.
The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2080. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōlia - Po‘ipū - Kalāheo districts), water use in 2085 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makuwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors to the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Green Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the...
current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūʻulipā will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 9 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 9 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kūloa-Pōʻipū region were also calculated. Nitrogen input to the marine environment in the Pōʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pōʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downstream from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waïpōʻipu Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be initiated in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

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Clean Air Act

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Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day. Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient
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This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawaii Dairy Farms": [http://tinyurl.com/OEQCExAUA](http://tinyurl.com/OEQCExAUA)
To Whom it May Concern:

As a long time resident of the Poipu area in South Kauai, I would like to express my vehement opposition to the proposed Māhā‘ulepū dairy farm, which is in the planning stages in South Kauai. My family has reviewed all of the pertinent facts surrounding this project, which has not been well planned from the outset.

The very thought of invading a pristine residential environment, coupled with a premier resort complex, is ill advised at best. The many faceted negative ramifications of this proposed project are obvious to the most uninformed group of residents on Kauai.

At the top of the list is the destruction of the current traditional environment, nurtured by the Hawaiian community. The negative impact on the water supply is certainly paramount in the lengthening list of problems that the local community is facing. This is clearly followed by the odor, which will grossly affect the standard of living in nearby communities. These key factors are followed by the fly infestation, which will be evident and indefensible. The health problems will be inflated immeasurably and should fall under the jurisdiction of the environmental authorities.

Initial tests on the water supply in the area are irrefutable, inasmuch as they prove beyond a reasonable doubt that the water supply in the future will be affected by the increasingly large herd of cattle. With regard to the tax base on the island of Kauai, it is predictable that real estate prices will decline, hence, lowering the real estate taxes collected by the County of Kauai should the project move forward.

Your appropriate negative action relating to his matter, will be most appreciated, not only by my family, but to the large group of voters on the island of Kauai. In the interests of all concerned, if the project was moved to a more suitable location, it would resolve this issue immediately.

Respectfully submitted,

John & Terri Halliday
2355 Hoohu Road
Koloa, HI 96756

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and State Site 50-30-10S094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising, given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic era cultural materials associated with the many Land Commission Awards in the project area were nonexistent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhāʻulepū Ahupuaʻa, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-10S094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhāʻulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila musophila, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-ʻōhiā forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which harries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhāʻulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pads in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōā-Poi‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ala Inōkī Road between Kōā and Poi‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animal waste in the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix I.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on ʻOahu. Construction
employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 44 million gallons (367,197,800 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

Hydrology: The area’s hydrology is shaped by its geology. The Kūloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths — as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kūloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane operation period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.
plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

Towards the south.

The assessment concludes that the modest potable water demand from the dairy and the groundwater in the volcanic aquifer layer, which is the source of potable water.

Groundwater in the alluvium will not impact the County drinking water well.

Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing the amount of material used on-site; creating and implementing a Stormwater Management Plan; and establishing an Engineering and Construction Planning Permit.

The HDF site is located on the bottom-fed by several intermittent streams coming off the south slope of the Ha'upu Ridge. These normally dry streams converge in the terminus of Waiopili Ditch, of surface water and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Makalapa and adjacent watersheds. CWB conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. CWB also provided its data, however, DOH was unable to confirm the CMU’s recommendations.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and increasing demand for potable water for community and resort development.

Surface Water Quality: The Kaua'i Chapter of the Surfrider Foundation began Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to confirm the CMU’s recommendations.

Water Hydrologic districts, which are not perennial streams in the upper Makalapa Valley, which is flooded by several intermittent streams coming off the south slope of the Ha'upu Ridge. The HDF site is located on the bottom-fed by several intermittent streams coming off the south slope of the Ha'upu Ridge.

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maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35 feet from the top of drainageway (totaling 70 feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass core with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Koʻola-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipoli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditch down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kauaʻi community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

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ALTERNATIVES:

As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed project. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The
alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).

- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy-soil science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3).

- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy-soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of State’s fresh milk demand thus reducing dependence on imported milk (Objective 1).

- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy-soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEIC website at the following URL, search "Hawai‘i Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
February 22nd, 2014

Attn: Laura McIntyre (808) 586-4337
State of Hawa‘i'i, Department of Health
1250 Punchbowl Street,
Honolulu, HI 96813

State of Hawa‘i'i, Department of Health
919 Ala Moana Rd. Room 312
Honolulu, HI 96814

Attn: Jeff Overton (808) 523-5866
HDFE@Group7int.com
Group 7 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, HI 96813

Hawai‘i Dairy Farms, LLC.
P.O. Box 1690
Kīhei, HI 96754-1690

Comments to be considered in preparation of an Environmental Impact statement for:
Project Name: Hawai‘i Dairy Farms
Island: Kaua‘i
District: Poipu
TMK: (4) 2-9-003:001 (portion); 006 (portion)
(4) 2-9-001:001 (portion)

To whom it may concern:

Waters of the State and United States:

The scope of the EIS must include a thorough consideration of the Public Trust Doctrine as articulated by Article XI of the Constitution of the State of Hawaii. The Hawaii State Supreme Court has authored at least four major Decisions enforcing the Public Trust Doctrine and its constitutionally intended protection for the waters of the State: Waiahole I (1994), Waiahole II (2000), Na Wai ‘Eha (2012), and Kai‘ai Springs (2014). Each of these cases dealt with situations in which water on agricultural land was either being diverted or taken for use by an agricultural operation or bottling company. In all cases the Court found that such uses constituted a violation of the Public Trust Doctrine. There is no reference to this doctrine in HDFE’s EIS. Hawaiian Dairy Farm’s Waste Management Plan also fails to refer to or consider this doctrine. It needs to be addressed by both HDFE’s Plan and the EIS.

Hawaii Dairy Farms (HDFE) plans to irrigate the pastures at the Maha‘ulepu site with 2.93 million gallons of water daily (MGD) from the Waiakea Reservoir according to HDFE’s Waste Management Plan (WMP), pages 31, 37 and 44. Per HDFE’s leases with Grove Farm, their lease with Grove Farm entitles them to 3 MGD (million gallons daily) as a term of their lease contract. It may not be uncommon to have an agricultural lease include the use of water that is available on the agricultural site. In this case, however, the water that is available from the Waiakea Reservoir, an off-site reservoir that happens to be on other Grove Farm property, in water that collects from the Hulaia Stream diversion which now feeds the Waiakea since the cessation of cane cultivation in 1996. The volume of water HDFE plans to consume with irrigation of its 517 acres of grazing pasture (2.93 MGD) is substantial. But for the 100% diversion of the Hulaia Stream, the Puna District used to receive water from the Hulaia Stream, previously a major water resource for the natural watershed of the Nīnīnī River, the A‘eka‘a Fishponds and several native Hawaiian fishponds. The farmers of the Puna District (covering the area where the Hulaia waters flowed prior to the construction of the 100% diversion; in 1957) are currently involved with the Department of Land and Natural Resources (DLNR), Commission on Water Resource Management (CWRM) seeking restoration of the natural watershed and revision/take down of the Hulaia Stream diversion. HDFE’s planned water consumption from the Waiakea Stream operations exceed the Kai‘ai Springs 1000 (5 Gallon) containers of water per day that Kai‘ai Springs planned to draw from the stream flow. Kai‘ai Springs, Hawaii Supreme Court, SCWC-29440, 28-FEB-2014, pages 3-4. If the Public Trust Doctrine applied in Kai‘ai Springs it should certainly be a compelling consideration with the planned use of 2.93 MGD. Not only is the intended daily volume of water an issue, but of equal concern is the proposed new use of the water, the liquidation of massive amounts of waste (3 million gallons of wet manure and 200,000 gallons of urine monthly from the start-up herd of 699 and 8.5 million gallons of wet manure and at least 600,000 gallons of urine monthly if the herd reaches 2,000 as planned). Clearly, a thorough evaluation of HDFE's proposed new use for the waters of the Waiakea is warranted as well as a detailed analysis of the impact to "instream" and "out of stream" or "nonstream" flow standards.

Grove Farm acquired the Kokua Sugar Plantation which, like most sugar plantations, relied on an extensive ditch system to irrigate its crops. The Hulaia Stream diversion, a lengthy concrete diverter, covered by a steel grate that was is designed to divert 100% of the instream flow of the Hulaia Stream, located mauka of the Kaumuali‘i Highway/Route 50 provided the majority of the water relied on by Grove Farm for cultivation of the Kokua Sugar Company’s cane. When Kokua Sugar ceased operation in 1996, the extensive irrigation system was no longer in use. The 100% diversion of the Hulaia Stream was never revised. Despite the substantial decrease in need since the Kokua Sugar Company ceased its operations. Thereafter the diverted waters continued flowing in the Hulaia and flowed to the Waiakea Reservoir. The Waiakea has since become the largest reservoir in the State of Hawaii. There is little question that these waters are waters of the State coming from the South slope of the Kohala range in Kohala Mountain. The water runs from the 100% stream diversion into a concrete catchment and then flows through a tunnel in the Hapu‘u mountain range, ending in the Waiakea Reservoir. The EIS needs to include HDFE’s proposed new use and its probable impacts as well as an analysis and evaluation of the degree of impact from the proposed use on the existing downstream users, instream flow, instream habitats, and dependent wildlife species.

Although generally accepted that water use is included in the leases for agricultural purposes, the daily quantity of water needed for the proposed HDFE operation (2.93 million gallons per day from the Waiakea) plus the potable water to be drawn daily from the Maha‘ulepu wells far exceeds the typical agricultural use on Kaua‘i.

In Re "Hawaii Ground Water Management Area High-Level Source Water Use Permit Applications and Petition to Amend Interim Instream Flow Standards of Waihe‘e River and Waikī, Wai‘ele, Waipako Streams Contested Case Hearing Hawaii Supreme Court, No. SCAP-30603 August 15, 2012, the Court concluded that the Water Commission (WRM) erred in balancing instream and noninstream uses, and therefore, the Interim Instream Flow Standards (IFS) do not properly protect traditional and customary native Hawaiian rights, appurtenant water rights or the public trust, p. 3. Based on the cultural practices as well as the historic and archeologic sites of Maha‘ulepu, there is an equal if not greater risk at Maha‘ulepu. The EIS needs to consider, environmental concerns, native Hawaiian practices, outdoor and recreational activities, and aesthetic and scenic values, as required by the water code, p. 12-13 Those considerations are equally important the analysis of "offstream public trust uses, such as the public water supply."

p. 16: "... the water code and our case law interpreting the code have affirmed the Commission’s duty to establish IIFS that ‘protect instream values to the extent practicable’ and ‘protect the public interest’..." In re Water Use Permit Applications "Waikīhole III", 105 Hawaii 1, 11,
In Kaua‘i Springs the Court concluded that the water Kaua‘i Springs uses for its operations originates from an underground spring located several miles from the Property, 1,000 feet up Kahili Mountain. Kaua‘i Springs apparently “purchased” or “licensed” its water from EAK Kaua‘i Trust (Kaua‘i Trust), the owner of the land where the spring is located. The water is transmitted to the Property by a privately-owned gravity-fed system dating back to the 1890s, which is owned by Kaua‘i Trust and operated by Grove Farm Company (Grove Farm)." Hawaii Supreme Court, SCWC-29440, 28- Feb-2014, pages 3-4.

In Kaua‘i Springs, the State Department of Health offered “[t]here may be potential for ground or surface water degradation/contamination,” and therefore “recommend[ed] that approvals for this project be conditioned upon a review by the State Department of Health and the developer’s acceptance of any resulting requirements related to water quality.” The Water Commission further commented that “[g]round-water withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.” Finally, the Water Commission stated that although a water use permit was not required because the island of Kaua‘i was not a designated ground-water management area, other permits from the Water Commission may be required if the source of Kaua‘i Springs' water was modified:

The Island of Kaua‘i has not been designated as a ground-water management area; therefore, a water use permit from the Commission is not required to use the existing source(s) or to change the type of water use. However, if the source needs to be modified in any way, a well modification permit from the Commission may be required. In addition, if a pump is to be installed to induce additional water flow, a pump installation permit from the Commission would be required. If the source is modified to induce additional water flow, and the modification results in impacts to surface waters, a petition to amend the instream flow standard for affected surface waters must be made and approved prior to use of the water.


In fact, in Kaua‘i Springs, the Office of Hawaiian Affairs (OHA) argued that the Commission “upheld its public trust responsibilities by denying Kaua‘i Springs’ permit applications without prejudice, until the applicant can show, and the appropriate agencies can concur, that Kaua‘i Springs’ proposed use is reasonable/beneficial and will not interfere with public trust purposes.” Supreme Court, SCWC-29440, 28-FEB-2014, page 18. Shouldn’t Maha‘ulepu deserve the same if not greater protection for its rich sites, cave reserve, habitats, delicate ecosystem when a much greater environmental impact is threatened by the proposed industrial dairy than that posed by Kaua‘i Springs.

Example policy: the public trust doctrine requires an applicant to demonstrate the feasibility of alternative sources of water. The findings do not indicate whether Applicant complied with this requirement. “[P]ermit applicants must . . . demonstrate the absence . . . of alternative water sources. Such a requirement is intrinsic to the public trust.[J]” Walter I, 94 Hawai‘i at 161, 9 P.3d at 473; see also Kakai (Mohala), Inc., 116 Hawai‘i at 496, 174 P.3d at 335 ("[T]he Agency cannot fairly balance competing interests in a scarce public trust resource if it renders its decision prior to evaluating the availability of alternative sources of water.

Supreme Court, SCWC-29440, 28-FEB-2014, page 105

The Court held: "T. To assist agencies in the application of the public trust doctrine, we distill from our prior cases the following principles:

1. The agency’s duty and authority is to maintain the purity and flow of our waters for future generations and to assure that the waters of our land are put to reasonable and beneficial uses.

2. The agency must determine whether the proposed use is consistent with the trust purposes.

3. We provide this framework for assistance and do not indicate that it is mandatory or that it precludes other analytical approaches that are consistent with the public trust doctrine.

4. The Agency is to apply a presumption in favor of public use, access, enjoyment, and resource protection.

5. The agency should evaluate each proposal for use on a case-by-case basis, recognizing that there can be no vested rights in the use of public water.

6. If the requested use is private or commercial, the agency should apply a higher level of scrutiny.

f. The agency should evaluate the proposal under a "reasonable and beneficial use" standard, which requires examination of the proposed use in relation to other public and private uses.

Applicants have the burden to justify the proposed water use in light of the trust purposes.

8. Applications must demonstrate that the proposed use is reasonable and beneficial and will not interfere with public trust purposes.

a. Permit applicants must demonstrate their actual needs and the propriety of draining water from public streams to satisfy those needs.

b. The applicant must demonstrate the absence of a practicable alternative water source.

c. If there is a reasonable allocation of harm to public trust purposes, then the applicant must demonstrate that there is no harm in fact or that the requested use is nevertheless reasonable and beneficial.

"because it involves the use of an important public trust resource - fresh water - for personal financial gain," Supreme Court, SCWC-29440, 28-FEB-2014, page 17. This is all relevant to the HDF proposed industrial dairy as HDF’s impetus is certain to be of much greater consequence to the Helu Stream flow standards than Kaua‘i Springs ever intended to be.
d. If the impact is found to be reasonable and beneficial, the applicant must implement reasonable measures to mitigate the cumulative impact of existing and proposed diversions on trust purposes, if the proposed use is to be approved.

note 44 Wai-ale-ale v. Hawaii at 162, 9 P.3d at 474.

note 45 M. at 161, 9 P.3d at 473.

note 46 Kauai (Mokala), Inc. v. Hawaii at 499, 174 P.3d at 338.

note 47 Wai-ale-ale v. Hawaii at 143, 161, 9 P.3d at 455, 473.

note 48 The ICA held that the circuit court's COAs § 63 (record was "devoid of any evidence that Kauai Springs") existing or proposed uses might affect water resources subject to the public trust"); § 71 and § 72 (saying that Planning Commission "may" have public trust duties in this case) were "incornered in that they do not recognize the Planning Commission's public trust duties to consider and review Kauai Springs' water usage in its water bottling operation." Kauai Springs, 130 Hawai'i at 423, 312 P.3d at 299. In its Application, Kauai Springs do not challenge the ICA's conclusion that the Planning Commission had a duty to consider Kauai Springs' water usage in reviewing its permit application. Rather, Kauai Springs argues that the ICA erred in vacating the circuit court's COA because the circuit court recognized the Planning Commission's public trust duties and correctly found that the Planning Commission fulfilled these duties.

Supreme Court, SCWC-29440, 28-FEB-2014, pages 85-88

Alternatives:

In the EISPN, the discussion of alternatives, offering only one other location to be considered, fails to satisfy a real alternative evaluation for an operation that is well known for its significant adverse environmental impacts. Clearly, the EIS must explore at least three other locations at a minimum.

In its discussion of a Confined Dairy Operation Alternative, HDF proposes a "Confined Dairy Operation". Assuming the public trust water rights are adequately protected and preserved, if HDF chooses to proceed with a true CAFO, the EISPN offers only that the Māhā'ulepū location would require additional manure management as nutrients would not be returned to pastures. Additional grain and forages would be imported to sustain dairy cows. The Confined Dairy Operation Alternative would utilize large barns to house and feed the cows. Animals would be confined within the barns and milking parlor; no pasture area would be required. No manure would be deposited on pasture grasses and grass would not be utilized as a locally available feed source. The EIS must address why feed cannot be cultivated on the property, why a methane digester cannot be implemented saving electricity consumption from the Grid that would also help to collect manure, lowering the odor, fly and other pest problems to potentially feasible levels. To address alternatives, the scope of the EIS must be expanded to include these and other related considerations.

Important Agricultural Land (IAL), Hawaii State Constitution, Article XI, Section 3.

The EIS must consider HDF's website boast that it intends to be the "first commercial use of IAL land". Is that what the State intended when the provisions of the IAL enactments were adopted? Is IAL land even appropriate for a commercial agricultural operation? This must be addressed by the.

HDF's claim that their proposed industrial dairy will lead to agricultural self-sufficiency must be substantiated in the EIS, especially when the WMP calls for shipping the milk off island, selling the milk wholesale to another company who would then process, bottles and distribute for sale at locations they select.

Sugar cane cultivation has left the proposed farm soils "depleted of essential nutrients" pg 56 HDF WMP, Section 8.1. The EIS needs to substantiate the scientific support for their claim that the proposed dairy would in anyway improve the soil at Māhā'ulepū. Hooves from 1200 pound cows are in themselves degrading to soil, contributing to erosion and nutrient loss. The addition of nutrients does not remediate soil and the EIS needs to address the claimed benefit of an industrial dairy to the soil composition at Māhā'ulepū.

Table 6 - Potential Impact Categories for Liner Failure
1. Any underlying aquifer is at a shallow depth and not confined
2. The vadose zone is rock
3. The aquifer is a domestic water supply
4. The site is located in an area of solutionized bedrock such as limestone or gypsum.

Considerations for Minimizing the Potential of Waste Storage Pond Liner Failure.
Sites with categories listed in Table 5 should be avoided unless no reasonable alternative. 313 p 6 of 7

NRCS, PI

April 2012

Table 4 - Potential Impact Categories from Leak of Embankment or Accidental Release
1. Surface water bodies — perennial streams, lakes, wetlands, and estuaries
2. Critical habitat for threatened and endangered species.
3. Riparian areas
4. Farmland, or other areas of habitation
5. Off-farm property
6. Historical and/or archaeological sites or structures that meet the eligibility criteria for listing in the National Register of Historical Places.

Cultural Practices, Historical and Archeological Sites are at risk. The foregoing considerations are from the NRCS manual stepped to the back of the WMP but were not specifically incorporated in or addressed by the WMP. The EIS needs to address these aspects of the NRCS and others as well to cover this risk which from our present evaluation, especially based on the findings of the Custom Soil Resource Report of the NRCS, dated June 5, 2014.

Respectfully,
Robert and Bridget Hammerquist
States. As noted previously, the HDF system is designed to utilize 100 percent of the cows' manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term "zero discharge" as it was construed as no nutrients into the system.

Subject: Hawai'i Dairy Farms Environmental Impact Statement Preparation Notice

Māhāulepū Road
Kaua'i, Hawai'i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Bridget Hammerquist:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai'i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhāulepū Valley on the island of Kaua'i to produce fresh, locally available nutritious milk for Hawai'i families. The rotational-grazing method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISP), published January 23, 2015, described the proposed pasture-based rotational grazing system as a "zero-discharge, grass-fed dairy". The term "zero-discharge" under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAND) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows' manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term "zero discharge" as it was construed as no nutrients into the system.

The term "grass-fed" was used in the HDF EISP. This term was used to identify HDF's intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd's diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of "grass-fed". The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of "grass-fed", the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area "footprint" will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd's primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient "dry matter" grass yields essential to a cow's diet. Additional project-specific trials at the Māhāulepū site on Kaua'i have been conducted for more than 19 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows' diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as "mob", mimicking the natural social order of herds. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximize grass as the
cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be
healthier and live longer, productive lives with access to fresh air, high quality feed,
and exercise while they forage. The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setsocks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural water depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. More information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā‘ulepū site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with hormone growth referred to as BST or rBGH.

**SOILS:** Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during dryer periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawai‘i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watersheds-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soils Resource Report for Island of Kaua‘i, Hawai‘i.” The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselected parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.
The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kailhi Clay at 32 percent, Ka‘ena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micromutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas “drainage” refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrates to gaseous forms, which reduces the potential for impacts on waterbodies. In this way, “poorly drained” soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than “well drained” soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai’i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

ARCHEOLOGICAL AND CULTURAL: The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIR Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic era cultural materials associated with the many Land Commission Awards in the project area were non-existent, as explored through survey and subsurface exploration.

The six historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burial, and no bome were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Mā‘ai‘elepu‘u Ahupua’a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully endorsed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.
WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kūloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Sapolilite, a soft, thoroughly decomposed rock. The Māhā’ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kūloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black alluvial clays and loams.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in feet per day. It is a measure of how easily water will move through the ground. The hydraulic conductivity of the alluvium that underlies Māhā’ulepū Valley and the HDF site ranges from 0.3 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kūloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā’ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā’ulepū 14 well during the sugarcane plantation era. All potable water used as water for livestock will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā’ulepū 14 well and the County’s Kūloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā’ulepū Valley, HDF established a 1,000-foot setback surrounding the Kūloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kūloa-Poipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kūloa - Poipū - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā’ulepū Surface
Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data; however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffer: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageways (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainages such that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainages. Only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.
To provide perspective, nutrient inputs from the adjacent Kīloa-Pōpuʻi region were also calculated. Nitrogen input to the marine environment in the Pōpuʻi region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pōpuʻi region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipio Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the DraftEIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kauaʻi community.

ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawaiʻi Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kauaʻi; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kauai in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).

The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.

Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawaii Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

Hawaii Dairy Farms will create a commercial scale pasture-based dairy operation in Hawaii, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

The planned action will generate new long-term employment in the agricultural sector on Kauai, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).
Comments submitted regarding HDF Environmental Impact Study (E.I.S.):

Aloha,

My legal and hereditary name is Kalani'ukumil Koa Moka'aniu 'O Na Ali'i Hanohano. I was born in, and am a native resident of Koloa, Kauai. I am established in the Hawaiian custom, as a lineal descendent of the aboriginal Stewards (7th generation), of the Koloa Moku, or District, which includes Maha'ulepu. My Kupuna's "Anokale" or Uncle, Kaluhiwai Nakapa 'ahu, was a noted native medicinal practitioner (Marvin Bremecrke 1953), who gathered medicinals in Maha'ulepu and Pua'a. His father, Kalipolokolien Nakapa 'ahu, Alli 'Ili l Nui of Koloa District (Moku, owned, and resided on a nine acre parcel in Aweoweoa (Hidden Valley- adjacent to Maha'ulepu). I have followed in his footsteps for more than a quarter century. As a native spiritual practitioner representing a registered Hawaiian non-profit Interfaith Ministry (Hui Hanai), continuing cultural practices and observances at Maha'ulepu, this Dairy will affect cultural resources that I am dependent upon. I proclaim myself to be a vested party-at-interest seeking Intercourse status.

As a participating member of the Iloolu'okalani Coalition, alert to Incursions or Intrusion on Cultural sites or practices; as Pastor of "Hui Hanai I ka Huna Loa" a registered non-profit Interfaith Ministry; as Steward of: "Malamo Maha'ulepu" 501 c-3); "Friends of Maha'ulepu" and Koloa 'Aha Moku Council, I do not speak for or represent these organizations, but share with them and desire address of their, and my concerns.

I will be directly impacted by the Dairy installation introducing high volumes of nitrate rich untreated solid waste and urine affecting three precious qualities to which I, and the Community have inalienable rights, that of Clean Water, Environmental contamination protection, and Quality of Life.

Neighbors in the nearby communities of Kauai's South-Shore will also be impacted by the degradation of water quality (ocean & aquifers), contamination of soil, odor caused by prevailing winds, or lack thereof, biting flies, affecting residential and Visitor Destination "Quality of Life" issues along with economic collapse of one quarter of the island's tax-base.

Land and aquatic life in the downslope and drainage watershed from the proposed site will be impacted by the inability of HOF to achieve complete containment of seepage resulting from the Dairy operation into the surrounding areas. This is substantiated by the NRCS Custom Soil findings commissioned, distributed, but not taken into consideration by HDF.

ISSUE of conflict w/ use of Group 70 conducting the E.I.S.: "Group 70" developed the existing Waste Management Plan and prepared architectural blueprints for all of HOF's proposed Dairy Installation. As analysis of this Plan and projections has been reviewed by qualified independent experts to contain serious flaws and misrepresentations questioning the credibility of their research and facts, does it not stand to reason that in the interest of propriety and competency, that an unbiased third party conduct the E.I.S.?
lava tubes permeating the impacted area; Nene, Limu, Opilik, Wana He'e, Loli; Honu, & Monk Seals, vegetation and sea-life important to Hawaiian culture and PASH resource management populations are at risk from run-off and inundation.

10: Detritally affects air or water quality or ambient noise levels: Odors, biting flies, bacterial colonies, ambient noise during seasonal cessation of winds, penetration into public water supply, ammonium interactions with the ambient atmosphere affecting vegetative growth.

Issues of Water quality, contamination of public drinking water, penetration of contaminants into the aquifer; soil and lava tube run-off projections calculated to include events such as the 1948 Forty-two day and 2006 30-plus day rain events.

11: (Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estury, fresh water or coastal water): Soil categorization by NCRCS as High to Very High risk of run-off impacting Wetlands, beach zones, estuaries, tide-pools, reef, coastal and shoreline waters impose eventual wide-spread damage as suffered by New Zealand, Washington State, Wisconsin and New Mexico.

12: No comment at this time.

13: No comment at this time.

The 2001 Office of Hawaiian Affairs Report to Jennifer Dines of the Federal Communications Commission (FCC) identifies the Haupu Range (including it's Maha'ulepu Valley), as a Hawaiian Spiritual Sanctuary and Mausoleum of Ancestral remains. Widespread native burials throughout the region including the single largest Burial In the Pacific (Awao'weonut) establish qualification of "Sacred Spaces" designation as defined and protected under the 1978 Religious Freedom Act (American Indian [i.e., Indigenous natives/ Alaska; Hawaii/ American Samoa].

Unmarked sites, burial grounds, ceremonial "Wahi Pu'a", Sub-surface cultural layer material, proximate wetlands known but undisturbed, require a thorough cultural resources study and ensure mitigation measures to ensure protections.

Consider impact to and degradation of Indigenous cultural use of natural land and aquatic resources protected under PASH.

Alternative uses of area: Restoration and encouragement of Kalo (Taro), cultivation and production of a natural resource (Kalo) qualifying for protection under the U.S. Supreme Court [1944] "Religious Freedom" determination that "Cattlinite" (Pipatame), was a protected "Spiritual" natural element integral to established Indigenous religious practices. The Court codified protections ensuring that the metamorphosed natural ceramic conductive substance, religiously employed as a Spiritual conductor, would be protected and available to recognized tribal members at no cost using traditional seasonal harvesting techniques, (decision subsequently bolstered by President Clinton's 1978 Executive Order).

As it is well established that every part of the process in Hawaiian Kalo cultivation, preparation and ingestion is a religious act, in honouring "Haloa", a recognized cultural deity, the rare hydromorphic "plastic-like" clay soil providing the optimum conditions for Kalo cultivation qualifies for protections under "best and highest use" of the land as well as PASH protection as a rare natural resource culturally sustained in Religious practice.

(similarly protected culturally used natural resources used in Religious practices include Awa (Kava), alle (mineral), "Tschulch" (Indian Celery), and Peyote).

Alternative agricultural uses: Bio-mass generation, Sustainable energy production; endemic biodiversity and cultivation of medicinal herbs such as Cats-claw, Danelo (Turneric), crops of Taro, sweet potato or yams, conforming to the "highest and best" sustainable practices of land use.

Fails to address: Overflow discharge of effluent ponds resulting from tropical storm and hurricane rainfall amounts historically reoccurring with frequency over affected area with high to very high run-off potential.

Proximity of Ditch to Milking facility yard and "lot" sized rotating pens vulnerable to nitrate penetration. "Lots" of open rotating four to five acre fenced parcels, cannot sustain intended herd population size with adequate room, native and introduced grasses, subsequently requiring an estimated 25% supplemental imported grain based feed with no details as to its' source or GMO status. As such, it fits the definition of a "Feed Lot" (albeit rotating) operation subject to additional limitations, controls and restrictions on operation.

Employment of mechanized distribution of aerosolized manure with re-deployable equipment crossing or in proximity to ditches, we sites, or seasonal wetlands used by native endangered waterfowl is in conflict with reviews of current Industry standards and practices.

Note: The American Public Health Ass. (also Canada & Michigan) have called for a Nationwide Moratorium on industrialized Dairy operations (2003) such as this present Plan. Does HDF contest or refute these findings? How do they substantiate this?

Implications of the total of increased cattle populations on Kaua'i resulting from maintaining consistency of Dairy herd size, i.e., How many heifers, steers, cows (inactive or inacam), will be in addition to an eventual Milking herd of two thousand cows? A

Issue of a flawed and Inadequate Cemetery Plan failing to contain nitrate penetration into downhill watershed. Current projections fail to address aftermath of catastrophic events from weather or disease. Designation of a 694 foot double row of interments two feet apart cannot adequately provide sanitary containment. Furthermore, seepage and penetration into downhill watershed is inevitable and deleterious to the environment.

The watershed of Maha'ulepu Valley (and HDF's proposed 578 acre industrial dairy site) comprises waters from the Haupu mountain range, the Waipio Stream, as well as the irrigation ditches, all of which are "hydro-logically linked" as they emerge and converge at the Mauioahui Cave on their direct path to the ocean. Based on that critical feature, all waters being hydro-logically linked, how can HDF protect the wetlands, the endangered species, the reefs, the rare and sacred sites and the ongoing native Hawaiian cultural practices from contamination caused by the massive amounts of wet manure and urine produced daily even with their start-up herd of 699 pregnant dairy cows? Short of lining the entire surface of the proposed farm site, the established hydrological link between the various components of the Maha'ulepu watershed make runoff, discharge and contamination unavoidable.

For the aforementioned concerns and issues raised, I urge that HDF agree to an alternative contractor to perform the E.I.S. and address of all issues raised or alluded to in these comments.
I again urge Olapa, HDF, and Grove Farm Co. to reconsider and relocate their intended Dairy operation to a more appropriate location.

Kalanikumai Ka Maka 'uli 'uli 'O Na Ali'i Hanohano
P.O. Box 1551, Koloa, HI 96756
<nurture.hope@hawaii.rr.com>
(808) 332-0718

Dear Kalanikumai Ka Maka 'uli 'uli 'O Na Ali'i Hanohano:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**GROUP 70 OBJECTIVITY:** Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai'i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai'i Revised Statutes and the "Environmental Impact Statement Rules" (Chapter 200 of Title 11, Hawai'i Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State, and Federal agencies. On numerous past EIS projects, the Hawai'i Chapter of the American Planning Association has recognized Group 70's professional work with Chapter awards for excellence in environmental planning. Part of the EIS scoping process involves Group 70's

May 26, 2016

Kalanikumai Ka Maka 'uli 'uli 'O Na Ali'i Hanohano
P.O. Box 1551
Koloa, HI 96756
nurture.hope@hawaii.rr.com

Subject: Hawai'i Dairy Farms Environmental Impact Statement Preparation Notice
Mēhāʻulepū Road
Kaua'i, Hawai'i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001: 001 portion

Dear Kalanikumai Ka Maka 'uli 'uli 'O Na Ali'i Hanohano:

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DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepu Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepu site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gan irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and...
Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua’i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soils Resource Report for Island of Kaua‘i, Hawai‘i.” The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kālāhi Clay at 32 percent, Ka‘ena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen, phosphorus, calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas “drainage” refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrates to gaseous forms, which reduces the potential for impacts on waterbodies. In this way, "poorly drained" soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than "well drained" soils (Yost, 2016).

irrigation water. Nutrient management is the practice of managing the amount, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāʻulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; before (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of management. Managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

SOILS: Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainfall for use during dryer periods, to filter and buffer potential pollutants from leaching fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversity to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawaii at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.
The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs, and its potential to impact offsite. The assessment's findings are documented in the project's Cultural Assessment Report.

The project area includes historic properties, including the Hawaiian Heiau, a carved petroglyph boulder, and a number of historic-era bridges, ditches, and culverts. These resources are located outside the project area and are not expected to be impacted by the project.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened, or proposed for listing under Federal or the State of Hawaii's endangered species programs. Located onsite are four species of endangered waterbirds, including the Hawaiian Goose, the Nene, the Hawaiian Coot, and the Hawaiian Stilt. These species were recorded on the site and at the nearby taro farm located within the HDF site. Although the area does not provide critical habitat for endangered species in the upper Mahaholu Valley, four species of endangered waterbirds were recorded on this site, which may provide critical habitat for these species.

Avian and mammalian surveys were conducted in August 2014 by Ranah Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian and mammalian species on the property. The survey determined that the site is not critical habitat for any species, and no rare or endangered species were identified. However, the survey did identify a total of sixteen historic properties, which have been assessed for significance by the State Historic Preservation Division (SHPD) under Hawaii State law and the National Historic Preservation Act (NHPA). The SHPD is responsible for ensuring that these sites are protected and preserved for future generations.

The project area includes a number of historic-era sites, including the Hawaiian Heiau, a carved petroglyph boulder, and a number of historic-era bridges, ditches, and culverts. These resources are located outside the project area and are not expected to be impacted by the project. The proposed project is fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous exercise of native Hawaiian rights.

In Summary, the proposed project is unlikely to have a significant impact on any of the cultural resources, practices, or beliefs examined during the cultural assessment. The project is fully enclosed by perimeter fencing, and all potential cultural resources, practices, or beliefs identified outside the project area are expected to be protected and preserved.
A healthy population of dung beetles can help control flies by burying dung in the soil. This process contributes to the diet of flies such as the stable fly and horn fly. The stable fly, which requires approximately 21 days within the dung patty for the immature life stage, is common in areas with high pet populations. These pests are successful during the day, while the horn fly, which requires 5-20 days, is present at the HDF site. Pest in sects such as flies can negatively impact livestock and therefore are actively managed to prevent stress and loss of productivity at dairy operations.

Insecticides and herbicides are non-discriminatory and kill beneficial as well as pest insects. Beneficial insects include primary decomposers such as earthworms, and biodiverse bee hives. The study included a field survey that used manure from an adjacent beef cattle herd as a lure, and determined flies and other manure-related insects currently present at the HDF site. Introduction of dung beetle species resulted in a significant reduction in flies. The study also evaluated the potential impact of introducing predatory species to the site. Predatory species such as parasitic wasps were observed in the manure, and it was found that species-specific wasps could be introduced to the site. The study concluded that the introduction of dung beetle species to the HDF site would be beneficial in controlling fly populations. The study also evaluated the potential impact of introducing predatory species to the site. Predatory species such as parasitic wasps were observed in the manure, and it was found that species-specific wasps could be introduced to the site. The study concluded that the introduction of dung beetle species to the HDF site would be beneficial in controlling fly populations.
in accordance with regulatory labeling requirements. HDF will implement long-term integrated pest management, which utilizes knowledge of the ancient food web among species by disrupting the manure habitat required to complete the fly life cycle. HDF and other ranchers on Kaua‘i may choose to engage with the State Department of Agriculture to translocate dung beetle species already introduced on Kaua‘i to Māhā‘ulepū and other areas where manure-related flies may be a problem.

**IMPACT OF SPRAYS ON BEES**

Beneficial insects include primary decomposers such as earthworms and dung beetles, and pollinators including bees. Honey bees are an essential part of any agricultural ecosystem, and were observed on site during the invertebrate species survey. Pesticides and herbicides can reduce populations of beneficial insects, which is why HDF will utilize an integrated pest management approach.

It is expected that honey bees will visit water sources set up for the HDF herd. Preventative measures will be built into any open water source to prevent bees from being trapped, and HDF will contact local beekeepers for advice regarding any bees or bee colonies encountered on site. Safe application practices for any unavoidable herbicide or pesticide will be utilized in order to narrowly target the correct pest species without harming other insects and animals in the area. Anyone using herbicides or pesticides will be properly trained and informed, and if a honey bee colony location appears to be a danger to workers or cattle, or to be in danger itself, a local beekeeper will be contacted for advice and removal.

**PESTS:** A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā‘ulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix E.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila muscipula, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-‘ōhi‘a forests.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i’s Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix K.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, mokers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10% of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of...
milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 44 million gallons (36719780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER
Hydrology: The area’s hydrology is shaped by its geology. The Kīlauea area was built by Nāpali formation lavas of the Waimea volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ule‘pū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kīlauea series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the aquifer that underlies Māhā‘ule‘pū Valley and the HDF site ranges from 100 – 500 feet per day. The hydraulic conductivity of soils in the adjacent Kīlauea–Pā‘ū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ule‘pū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health (HDF) Rules require that potable water be used for milk production, both in the milking parlors and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ule‘pū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ule‘pū 14 well and the County’s Kīlauea F well will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.
Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa Well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction

Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the National Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways;
only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:**

The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūle`ipai will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). As this nutrient run-off would not occur as chronic daily releases, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kūka`a-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Po`ipu region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po`ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment:**

An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipio`pū Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:**

Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CBW, dairy neighbors and the local Kau`a`i community.

**AIR QUALITY:**

As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a wind rose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai`i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

**DUST**
Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours - in two separate milking cycles - moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM0.5 and PM2.5) measured on the island of Kauai, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM0.5 is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM2.5 is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the ES include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action's purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6. The DEIS evaluates alternatives that could attain the objectives of the action's purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai'i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Reusing the land for resort or residential development, or a potential conservation or condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-
Based Dairy at an Alternative Location on Kaua'i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai'i, with the capability to produce 10 percent of the State's fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua'i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

In contrast to the other options considered, the planned agricultural operation of Hawai'i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

Hawai'i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai'i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua'i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai'i Dairy Farms": http://hawaiifarms.org/OEQC/KAUA

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Aloha,

I have very serious concerns about the proposed dairy at Mahaulepu Valley on Kauai. I am glad that an EIS will be prepared and hope that it will address the many issues, environmental, social and cultural, that a dairy in this location presents. While HDF states they are voluntarily doing this process, to truly be pono, this should have been done well in advance of any infrastructure changes or the announcement that a dairy IS going in at this location, as the EIS is designed to determine whether a project like a dairy should go in by providing substantive data that indicates that it will not be environmentally, culturally or socially harmful.

NUMBERS

Beginning with the proposed herd and the recent “reduction” in herd size to 699 (a significantly chosen number as 700 cows is classified as a Large Confined Animal Feed Operation). What is not noted by HDF with this revised herd size is that those 699 cows will be shipped in pregnant, thus there will be double that number after gestation. Males will then be thinned out through outsourcing and killing of a certain amount, so that 699 would be about 900 cows on the land after gestation. Regardless of this claim of a reduced herd size, the EIS must evaluate the plan based on the proposed final herd size of 2,000.

WASTE

According to the EPA, waste estimates for dairy cattle are equivalent to 164 times the amount of humans, thus the 2,000 cows would produce waste equivalent to approximately 328,000 people, fully 5 times the population of the entire island. Microorganisms causing health risks to humans like E. Coli, enterococcus and leptospirosis are common in the feces of cattle, these organisms could likely end up in the adjacent streams leading to the ocean as well as groundwater.

SOIL

HDF should be required to do a detailed, accurate soil survey to determine once and for all if the soil is able to handle the amount of waste that will accumulate and be applied via airborne spray as fertilizer. Again, had HDF followed proper protocol and done an EIS at the outset, perhaps they would have provided more accurate information on the soil in the area in question. Their initial plan stated that soil in the area was porous volcanic, which it is not. A later NRCS survey of the soil indicates that most of it is primarily clay with “very limited” capability to handle manure load and has a high potential for runoff.

DRINKING WATER WELLS

HDF should be required to do an extensive groundwater study to assess effects of waste applied to the soil. Their current Waste Management Plan does not identify all of the nearby drinking water wells and misrepresents the distance of some of those that are identified on the map. Most significantly, one well (Koloa F) is very near to the area in which their wastewater treatment plant will apply the sludge that accumulates in the ponds.

AIRBORNE CONTAMINANTS

HDF plans to spray waste from the effluent ponds on the fields as fertilizer. These spray machines are very tall and with dominant trade winds the possibility of spray affecting homes and businesses downwind is a potential problem. The EIS must address airborne contaminants produced by the dairy and the environmental, health, and social impacts.

SOCIAL CONCERNS

The Mahaulepu area is popular for nature oriented activities and subsistence such as fishing, hiking, beach-going activities, bird watching and more. The EIS must address how these activities would be impacted by environmental effects from a large dairy of this size upstream of the beach-going area.

The Koloa/Poipu area is home to approximately 3,000 residents, all of whom will be downstream of the dairy and thus affected by any airborne contaminants or odor. The area is also one of the top 3 visitor destinations, providing significant income to both County and State through property, TAT, general excise and other taxes. Environmental air, water and vector control concerns from the dairy would reduce property values and make the area less desirable to visitors. The largest private employer for the island is within 2.5 miles of the proposed dairy and a thriving visitor industry encompasses the entire Koloa/Poipu area, a decrease in visitors to the area would adversely affect those employers thus causing loss of jobs and income for island residents. Reduced property values and visitors to the area would not only affect the local economy through loss of jobs/decreased incomes for residents, but reduced revenues for the State and County as well.

The above noted concerns should all be fully addressed by the EIS for Hawaii Dairy Farm’s proposal at Mahaulepu Valley. Given the open, available, leasable land on the island, particularly that owned by Lessor Grove Farm, this seems to be one of the most ill-suited locations for such an operation. It’s proximity to freshwater sources, the ocean, nearby homes and businesses make this an extremely poor location.
location for a dairy, especially given that all milk will have to be trucked to the port in Nawiliwili for shipment to Oahu for processing. The above noted environmental, health & social concerns in addition to this fact, render this a plan that will negatively impact the environment and economy of Kauai.

Mahalo for your careful consideration of my concerns and your diligence in evaluating the impacts of this project.

Lisa Hartman

May 26, 2016

Lisa Hartman
lisahartman009@gmail.com

Subject: Hawai’i Dairy Farms
Environmental Impact Statement Preparation Notice
Mahalapu Road
Kaua‘i, Hawai‘i

Dear Lisa Hartman:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Mahalapu Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations...
(CAP) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows' manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term "zero discharge" as it was construed as no nutrients into the system.

The term "grass-fed" was used in the HDF EISP. This term was used to identify HDF's intent to utilize a locally-produced feedstock - grass - for more than 70 percent of the dairy herd's diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of "grass-fed". The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of "grass-fed", the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area "footprint" will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.2.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock - grass - as the herd's primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient "dry matter" grass yields essential to a cow's diet. Additional project-specific trials and on-site pasture management practices developed on the Ma'ili site on Oahu have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet. Improvements in grass productivity are anticipated to provide up to 85 percent of cows' diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as "mob," mimicking the natural social order of bowies. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows' primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, raccoon fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditches banks, increase net carbon storage, and improve and maintain water quality.

Therefore, HDF elected to discontinue use of the term "zero discharge" as it was construed as no nutrients into the system. The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waiai Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

The NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for Hawai'i is the parenthetical inclusion of the word "nutrients." Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. The effluent storage ponds will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Ma'ili site and provided essential colostrum and nutrients for a healthy start. During the calves' initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Oahu to be raised off-site. The committed herd size of 699 mature dairy cows at the Ma'ili site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and the committed herd size of 2,000 mature dairy cows at the committed herd site.
other partner ranches as needed for animal health and dairy productivity. This will however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalihi Clay at 32 percent, Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows that the soils are depleted of nutrients, which is typical for lands formerly used for sugar cane. The soil nutrient status and fertility demand of the primary crop, Kikuyu grass, will be raised until ready to return to application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of growth, to absorb and hold rainwater for use during dryer periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microorganisms to flourish and diversity to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and movement of water within or from the soil profile. Poorly drained soils, which have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. Poorly drained soils typically will have low hydraulic conductivity or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential for impacts on waterbodies. In this way, "poorly drained" soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than "well drained" soils (Yost, 2016).

Conservation services is a core principle behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using scientifically validated tools and standards in agriculture. Chapter 3, Section 3.2: these practices codes identify design and construction Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using scientifically validated tools and standards in agriculture. The user would like to display the developed Conservation District in December, 2013. The dynamic on ranch and healthy grass growth will build organic matter in the atmosphere, which benefits soil quality and enhance crop yields. According to current studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to organic management with a conservation approach can drive substantial accumulation of organic carbon in soil, with a soil nutrient status and fertility demand of the primary crop, Kikuyu grass, will be raised until ready to return to application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of growth, to absorb and hold rainwater for use during dryer periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microorganisms to flourish and diversity to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and movement of water within or from the soil profile. Poorly drained soils, which have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. Poorly drained soils typically will have low hydraulic conductivity or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential for impacts on waterbodies. In this way, "poorly drained" soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than "well drained" soils (Yost, 2016).
ARCHAEOLOGICAL AND CULTURAL: The Hawai'i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising, given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic era cultural materials associated with the many Land Commission Awards in the project area were nonexistent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside of the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burial, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhū'ulepū Ahupua'a has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai'i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua'i.

The HDF project would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai'i Island), approximately 10 percent of Hawai'i's milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua'i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O'ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36.719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai'i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua'i, and 2 indirect jobs on O'ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua'i and another 8 indirect jobs on O'ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.
Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area’s hydrology is shaped by its geology. The Kīloa area was built by Napali formation lavas of the Waimāne volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kīloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The unalluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transmit water given a hydraulic gradient and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kīloa-Po‘ipi‘i region is on the order of 201 – 501 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Portion Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.055 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kīloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kīloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kīloa-Po‘ipi‘i region is on the order of 201 – 501 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

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**Regional Water Demand:** The adjacent, developed Kīloa-Po‘ipi‘i region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2030, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kīloa - Po‘ipi‘i - Kalalahe districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well
Water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhūʻulepi Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhūʻulepi watershed.

The HDF site is located on the bottom-land of the upper Māhūʻulepi Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhūʻulepi Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kauaʻi Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhūʻulepi Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhūʻulepi and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part 1 of its report: Waiopili Ditch Sanitary Survey, Kauaʻi, Part 1. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhūʻulepi Valley. The ditches carry along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageway; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows. A small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūʻulepi will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.
The groundwater engineer estimated potential nutrient pass-through to provide an evaluation of air quality and odors, including a wind rose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) Regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for pollutants that are believed to present a significant health risk. The NAAQS serve as a trigger for state and local regulatory authorities to establish air quality standards for governing emissions from small businesses currently exist. No State or Federal regulations for greenhouse gas emissions from livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄), nitrous oxide (N₂O) and CFCs. The estimated concentration for PM₁₀, which is measured from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day, was 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅, which is measured from the same areas, was 0.17 μg/m³, less than half the Federal standard of 3.5 μg/m³ (see Table 4.19.1).

Potential odors and emission levels for air pollutants relevant to dairy operations will be conducted during such weather events.

As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor emissions during milk production and application. No State or Federal regulations for greenhouse gas emissions from livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄), nitrous oxide (N₂O) and CFCs. The estimated concentration for PM₁₀, which is measured from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day, was 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅, which is measured from the same areas, was 0.17 μg/m³, less than half the Federal standard of 3.5 μg/m³ (see Table 4.19.1).

Dust will be generated as cows move along soft limestone walkways that connect Dust Ditch with the paddocks and lead to and from the milking parlor. Potential fugitive dust emissions were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day. Applying the emission rates from this available literature greatly overestimates the minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment resulting from HDF. Cows in the rotational-grazing system will be on pasture 22 hours each day and spend 2 hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using an atmospheric dispersion modeling system (ADMS), the rates were scaled to the size of the pasture areas used by cows in HDF. Emission rates added to the plan of Kanu's and the total concentration was compared to the State ambient air quality standards. The estimated concentration for PM₁₀ was 2.0 μg/m³, which is well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ was 0.2 μg/m³, well below the Federal standard of 3.5 μg/m³ (see Draft EIS Section 4.19 and Table 4.19.1).

Air Quality

As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor emissions during milk production and application. No State or Federal regulations for greenhouse gas emissions from livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄), nitrous oxide (N₂O) and CFCs. The estimated concentration for PM₁₀, which is measured from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day, was 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅, which is measured from the same areas, was 0.17 μg/m³, less than half the Federal standard of 3.5 μg/m³ (see Table 4.19.1).
leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

[Signature]

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Alfred P. Havas:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. Your comments were received by the State of Hawai‘i Department of Health Environmental Planning Office. The Department of Health forwarded a copy of your comments to Group 70 International in order to be included in the Draft Environmental Impact Statement (EIS) analysis. This letter was prepared in response to your comments.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows‘ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

LAND USE: The historical and existing land uses of the project site and surrounding Māhā‘ulepū Valley were examined in the Draft Environmental Impact Statement (EIS), and uses proposed by the Hawai‘i Dairy Farms (HDF) project were evaluated in the context of county and state land use designations for the area. The evaluation of land use is presented in Draft EIS Chapter 4.4, and the project’s consistency with government plans and policies is presented in Draft EIS Chapter 5.0.

Sincerely,

Alfred P. Havas

Subject: Hawai‘i Dairy Farms

Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion
The south shore of Kaua‘i is home to some of the most productive farm land in the state, attributed to consistent sunshine, ample fresh water, and a large amount of Class A and B soils (with “A” representing the class of highest productivity soils and “E” representing the lowest). The large tracts of farmland, including those of Mahaulepu Farm and Grove Farm, allow for stability in support of farm ventures, help maintain regional water systems and provide agricultural employment for Kaua‘i residents in addition to fresh, local food.

The project site is an agricultural land in Māhāʻulepū Valley, an area with a long history of agricultural use as it was the first place in the island chain where sugarcane was commercially grown. The site is in the Agricultural District per State Land Use District designations, and per the County of Kaua‘i zoning ordinance. The site consists of land classified as Prime per the State Department of Agriculture’s Agricultural Lands of Importance to the State of Hawai‘i (ALISH). The HDF site is outside of the County-designated Special Management Area under the Coastal Zone Management Program.

In 2005, the State established Important Agricultural Lands (IAL) by statute. The purpose of IAL is to conserve and protect agricultural lands, promote diversified agriculture, increase agricultural self-sufficiency and assure the availability of agriculturally suitable lands. The designation process determines land meet physical requirements including contiguous, functional land units large enough to allow flexibility in agricultural production near appropriate infrastructure and water, with high quality soil agricultural productivity ratings under the Land Study Bureau of University of Hawai‘i.

In 2011, Mahaulepu Farm LLC filed a petition with the State of Hawai‘i Land Use Commission to designate 1,533 acres of agricultural lands in Māhāʻulepū (including 557 acres that make up the HDF site) as IAL. IAL designation meets the objectives of the State HRS §205-42 by contributing to the maintenance of a strategic agricultural land resource base to support a diversity of agricultural activities and opportunities that expand agricultural income and job opportunities. See Figure 4.4-2 in DEIS Section 4.4.

The designation process determined that the land meets a number of physical requirements established in HRS §205-45, including contiguous, functional land units large enough to allow flexibility in agricultural production near appropriate infrastructure and water, with 88.5 percent of the area featuring an overall soil agricultural productivity rating of “B” per criteria established by the Land Study Bureau of University of Hawai‘i.

The development and long-term operation of HDF will be in full compliance with its agricultural State Land Use District designation, ALISH classifications, and County zoning. The dairy farm will embody the intent of the IAL designation per the Hawai‘i State Constitution, by using these protected lands for the intended purpose of diversified agriculture, food production and agricultural self-sufficiency. HDF development of a dairy also supports the “secondary intent” for lands in the Agriculture land designation, to provide an opportunity for Kaua‘i citizens to reside in an agricultural community. This is in contrast to the described “agricultural subdivisions” that have changed parts of Kaua‘i intended for a rural landscape, with development as quasi-suburban landscapes dotted with residences on large lots.

Overall, the project provides long-term benefit and support of agricultural lands and industry through continued use in keeping with zoning and IAL designation. Long-term operation of the dairy does not preclude the region for future protection in a coastal park at Māhāʻulepū.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
19 February 2015

To: Ms. Laura McIntyre, Environmental Planning Office, Hawaii Dept. of Health,
1250 Punchbowl Street, Honolulu, HI 96813

cc: Group 70 International, Inc., 925 Bethel Street, 5th Floor,
Hawaii Dairy Farms, LLC

From: Donald E. Heacock, Aquatic Biologist

Hawaii Dairy Farms (HDF) proposes to establish and operate the first zero-discharge dairy in Hawaii using sustainable farming methods on 578 acres of land in Maha'ulepu, Kauai.

General Comments:
The HDF, as planned, is extremely unlikely to establish a zero-discharge dairy at this site in Maha'ulepu, Kauai, for the following reasons:

- Lack of appurtenant water rights,
- Located primarily (65%) on soils classified as “hard clay, impervious to water”;
- Located adjacent to streams and Class A marine waters along the Maha'ulepu coastline that is classified as Class 1 critical habitat for Hawaiian monk seals, seabirds and green sea turtles that live there;
- Receiving waters that are already polluted (with indicator bacteria and Nitrogen/Nitrate) as compared to Hawaii's Water Quality Standards,
- No mitigation plan: if something goes wrong, like thousands of gallons of manure/urine discharged into the ocean, the cumulative and negative impacts on public trust resources (like coral reefs), which may never recover.

Specific Comments/Recommendations:

1) Lack of Appurtenant Water Rights

The proposed HDF is dependent upon Grove Farm supplying them with irrigation water from Waitea Reservoir; Waitea Reservoir is dependent upon water diverted from the Huleia River by Grove Farm. However, neither HDF nor Grove Farm have appurtenant water rights to water from the Huleia River. The water now being diverted from the Huleia River to fill Waitea Reservoir results in the complete dewatering of the river (i.e., dry river bed below the diversion for 100-250 yards downstream), which blocks the migration of native Hawaiian stream animals which need to migrate upstream to their adult habitat, and downstream to spawn; 90% of native Hawaiian stream animals (‘o’opu, ‘ope‘ae and hiihau‘au’ are endemic, found nowhere else on Earth; furthermore, this severe dewatering of the Huleia River and its negative biological impacts, is-it-in violation of the Federal Clean Water Act (which requires the protection of the biological integrity of water bodies) and is contrary to the Hawaii State Water Code which is to protect the beneficial instream uses (such as production of fish and wildlife, swimming, aesthetic enjoyment).

Also a local group of native Hawaiians, two farmers and Kuleana land owners have formed “Hui Ho'opuapapua Na Wai o Puna” (lit: the people who want to restore the waters of Puna) to restore the instream flows of the Huleia, Hanamaulu, Wailua and other rivers and streams in the Puna District. The Hui is working with Earth Justice and will petition the State Commission on Water Resources Management (CWRM) to establish the Hanamaulu Aquifer (which includes the Huleia River to the South fork of the Wailua River as a “Ground and Surface Water Management Area”) and to restore instream flows to the streams and rivers within the Hanamaulu Aquifer. Because of the president’s of previous Hawaii Supreme Court Decisions and Orders (Waiahola, 2000 and Na Wai Eha (2014), the outcome of the Hui’s petition to CWRM can legally be determined.

Recommendation: Therefore, the EIS should include specific data/documentation establishing Grove Farm’s and HDF’s having appurtenant water rights to the water of the Huleia River for public trust beneficial uses.

2) Coastal Receiving Waters Already Polluted

Currently, according to water quality monitoring data collected by Dr. Cari Berg, Surfrider Foundation, Kauai Chapter, the nearby receiving waters are polluted far beyond the Hawaii Water Quality Standards with indicator bacteria and with nitrogen/nitrate. Therefore, any polluted storm water runoff from the proposed HDF site will further and cumulatively negatively impact coastal water quality, the coral reef ecosystem, and other public trust natural resources.

Because the recently completed USDA/NRCS detailed soil analysis of the HDF site, showing that the dairy site is composed primarily (65%) of hard clay soils impervious to water (which HDF neglected to cite/mention in their Farm Conservation Plan), it will be virtually impossible to prevent polluted runoff from the HDF site with such high cow stocking rates during periods of heavy rains. These discharges will cumulatively add to coastal eutrophication, coral reef degradation and to losses of public trust natural resources.

Recommendation: Therefore, with these points in mind, and based upon the Precautionary Principle, no NPDES permits should be issued until the existing water pollution in the area is cleaned up, and additionally, until HDF shows conclusively that they can prevent storm water discharges containing pollutants from the dairy.

Sincerely,

Donald E. Heacock, Aquatic Biologist

Subject: Hawai'i Dairy Farms Environmental Impact Statement Preparation Notice
Māhā'ulepū Road
Kaua'i, Hawai'i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Donald E. Heacock:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

HAWAII STATE WATER QUALITY CLASSIFICATION AND WATER RIGHTS

Water quality maps available on the Hawai'i State Department of Health website with a date of June 2014 and labeled “Draft” do not reflect the current Hawai'i Administrative Rules (HAR) §11-54, Water Quality Standards. Per §11-54-5.1 Inland water areas to be protected, and §11-54-6 Uses and specific criteria applicable to marine waters, all waters to be protected are listed in Appendices A, B, and C (dated July 1, 2014) of the HAR. No inland waters in the Māhā'ulepū watershed are included in the HAR §11-54 Appendix A. Therefore, no Class 1 Inland Waters exist in or around the HDF site. Marine waters downstream from the HDF site fall into open coastal waters Class A, as no embayments, marine waters, or open coastal waters in the area are included in the appendices of HAR §11-54 for special protection.

HDF’s right to use water from Waita Reservoir for irrigation and other purposes derives from Grove Farm. Grove Farm has advised HDF of its authorization from the Commission on Water Resource Management to divert the water that flows into the Waita Reservoir, and therefore does not need to have appurtenant rights to use surface water.

SOILS:

Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainfall for use during dry periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversely to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawai'i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua'i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a "Custom Soils Resource Report for Island of Kaua'i, Hawai'i." The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soil classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalihi Clay at 32 percent, Kāne'a Clay Brown Variant at 29 percent, and Laulaula Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, and microorganisms and other constituents. The results illustrate that the soils are depleted of nutrients which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu
grasses, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline of soil salinity and sodicity to provide future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus, calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas “drainage” refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential for impacts on waterbodies. In this way, “poorly drained” soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than “well drained” soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai‘i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grassed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.
The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 36,510 pounds annually, or 35 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,250 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment.** An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

**MITIGATION**

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

The potential for environmental accidents at the dairy farm will be minimal. Reviews and approvals are required from the State Department of Health for the waste management facilities. Standards and regulatory requirements must be met, and capacity beyond the required volumes has been added to provide additional backup storage. A secondary containment system has been designed as an additional safeguard. Risks to surface water quality are minimized with application of best management practices including vegetated buffer zones and 35-foot setbacks to exclude cows from farm drainageways. Effluent irrigation will not occur within 50 feet of agricultural ditches on the farm. Fuels and chemicals used at the dairy facilities will be used and stored following established rules and protocols.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: search "Hawai‘i Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

**GROUP 70 INTERNATIONAL, INC.**

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Mr. Healy:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**GROUP 70 OBJECTIVITY:** Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai'i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai'i Revised Statutes and the "Environmental Impact Statement Rules" (Chapter 200 of Title 11, Hawai'i Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State, and Federal agencies. On numerous past EIS projects, the Hawai'i Chapter of the American Planning Association has recognized Group 70's professional work with Chapter awards for excellence in environmental planning. Part of the EIS scope process involves Group 70's...
experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai‘i Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”; http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Stephen Hee  
May 26, 2016  

Subject: Hawai'i Dairy Farms Environmental Impact Statement Preparation Notice

Dear Stephen Hee:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

ARCHAEOLOGICAL AND CULTURAL: The Hawai'i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-

Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic-era cultural materials associated with the many Land Commission Awards in the project area were non-existent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhāulepū Ahupa'a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully endorsed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhāulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua'i but not seen at the
HDF site include the house fly, the dog dung fly and the chicken dung fly. These pests are common in areas with high pest populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for *drosophila musophila*, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa‘ohi forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawaii for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhā‘ulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pats in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōloa-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog cat, and chicken flocks. Beef cattle graze in the region on agricultural lands along Ah Kinoiki Road between Kōloa and Po‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animal wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

HDF: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 105 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 39,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaii’s Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evaporate-irrigation cycle. Long-term groundwater supply impacts are not anticipated to be significant.
The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well. Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 3,242 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

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Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CBW to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

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The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōoa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of 10,000 pounds per year, and one percent of phosphorus (totaling 900 pounds per year). Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kauaʻi community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provided an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure...
application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

**DUST**

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drypox" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m3, well below the State standard of 150 μg/m3. The estimated concentration for PM2.5 is 0.23 μg/m3, well below the Federal standard of 35 μg/m3 (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairies hens and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site, in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazig location. Actual odorous impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

**ALTERNATIVES**

As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawaii Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid,
reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua'i; and (3) milk products processing by HDF. The alternative of "No Action" is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai'i, with the capability to produce 10 percent of the State's fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).

- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua'i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of feed for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai'i Dairy Farms": http://tinyurl.com/OEOCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Gary and Jackie Heinen
1901 Poipu Road #713
Koloa, HI 96756

Subject: Hawai'i Dairy Farms Environmental Impact Statement Preparation Notice
Māhā'ulepū Road
Kaua'i, Hawai'i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001: 001 portion

Dear Gary and Jackie Heinen:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

ARCHAEOLOGICAL AND CULTURAL: The Hawai'i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau,
development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $140,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $80,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($75,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E
and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area's hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths - as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley and the HDF site ranges from 1.5 - 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poʻipū region is on the order of 201 - 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SANDWATER**

The State Department of Land and Natural Resources Commission on Water Resources Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hāʻupu Ridge. These normally dry streams converge into man-made channels running

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Gary and Jackie Heinen
May 26, 2016
Page 4 of 11

Gary and Jackie Heinen
May 26, 2016
Page 5 of 11
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HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes with the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.2.3 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā'ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Īlōlo-Po'ipū region were also calculated. Nitrogen input to the marine environment in the Po'ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater
and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipu region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipu‘u Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downstream to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agro/mixed science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food
in production utilizing Important Agricultural Lands, demonstrating the
importance of long-term agricultural leases and capital investment for
agricultural infrastructure, water systems and support facilities. (Criterion 3).
However, after years of trying, it appears there was limited interest in such a
venture.

- Finally, addressing the range of potential environmental impacts (natural,
cultural, social and economic) (Objective 8) the two alternative development
scenarios would generate fewer beneficial impacts and produce impacts that
could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of
Hawai'i Dairy Farms, was determined to be the most viable option and is the
preferred alternative. Of all the alternatives considered, this is the only approach that
achieves project objectives and meets each of the four Evaluation Criteria.

- Hawaiian Dairy Farms will create a commercial scale pasture-based dairy
operation in Hawai'i, with the capability to provide more than 1,000,000
gallons of the fresh milk demand, reducing dependence on imported milk
(Objective 1).
- The planned dairy location meets the requirements of minimum land area,
soil properties, slope conditions, water supply, land tenure and availability,
and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the
agricultural sector on Kaua'i, including pasture agronomy/soil science,
veterinary and animal husbandry, environmental resources management,
milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion
3) will occur with the proposed action, demonstrating the importance of long-
term agricultural leases, and the ability to draw capital investment for
agricultural infrastructure including water systems and support facilities
(Criterion 3).
- Address the range of potential environmental impacts by utilizing 100
percent of manure as natural fertilizer to grow the majority of food for cows
(Criterion 4). The alternatives evaluated would generate fewer beneficial
impacts and produce impacts that could potentially exceed those anticipated
from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains
agriculture, retains open space, and provides buffer between highly utilized
resort and residential development and sensitive natural or cultural resources
(Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact
Statement (EIS). The Draft EIS is available on the OEQC website at the following
URL search "Hawai'i Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Larry Heller
P.O. Box 387
Lawaii, HI 96765
hellerl001@hawaii.rr.com

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhāʻulepū Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Larry Heller:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

GROUP 70 OBJECTIVITY: Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai‘i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai‘i Revised Statutes and the “Environmental Impact Statement Rules” (Chapter 200 of Title 11, Hawai‘i Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State and Federal agency. On numerous past EIS projects, the Hawai‘i Chapter of the American Planning Association has recognized Group 70’s professional work with Chapter awards for excellence in environmental planning. Part of the EIS scoping process involves Group 70’s
experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai‘i Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Ku‘ai to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Ku‘ai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows spend 22 hours each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Wa‘ia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and...
irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepi site and provided essential colostrum and nutrients for a healthy start. During the calves' initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāʻulepi site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven't given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of management. Managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds' welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

**SOILS:** Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainfall for use during dry periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawai‘i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soils Resource Report for Island of Kaua‘i, Hawai‘i.” The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalihī Clay at 32 percent, Ka‘ena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas “drainage” refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential for impacts on waterbodies.

In this way, “poorly drained” soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than “well drained” soils (Yost, 2016).
As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai‘i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy's focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbon in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

**WATER QUALITY**

Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

Hydrology: The area's hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimāna volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths — as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is comprised of dark brown to black silt and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor; and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 1.05 — 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 — 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD) of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD plant established a 1,000-foot setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.
Regional Water Demand: The adjacent, developed Kōloa-Po'ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kauaʻi will increase county-wide by 17,300 residents by 2030. The South Kauaʻi population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kauaʻi region (the Kōloa - Po'ipū - Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hanapepe Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leakage or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile fabric and sediment logs around drain inlets.

Surface Water Quality: The Kauaʻi Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particular pollutants during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to
increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiʻoli Ditch provides the majority of freshwater input to the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kauaʻi community.

ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawaiʻi Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condensation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Convention Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kauaʻi; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and
neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2), grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).

- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities (Criterion 3).

However, after years of trying, it appears there was limited interest in such a venture.

- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability and accessibility (Criterion 1).

- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawai‘i Dairy Farms”.

Thank you for your participation in the environmental review process.

Sincerely,

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

GROUP 70 INTERNATIONAL, INC.
May 26, 2016

Tom and Ann Hennessy
2330 Ho'ohu Road # 22
Koloa, HI 96756
annhennessy@aol.com

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhūʻulepū Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Tom and Ann Hennessy:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

NATURAL HAZARDS: The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhūʻulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai‘i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone. The Kaua‘i and Ni‘ihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands.
Although they occur infrequently, Kaua‘i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhāʻulepū region during and following the hurricanes that affected Kaua‘i in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhāʻulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua‘i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasc Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, electricians, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $69,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices C and E. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**
The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāuleπī Valley well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāuleπī Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Unit and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipu region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa-Po‘ipu-Kaláheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāuleπī Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāuleπī watershed.

The HDF site is located on the bottom-land of the upper Māhāuleπī Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāuleπī Road. This ditch, named Wai‘ōpili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.
Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; the National Pollutant Discharge Elimination System (NPDES) – Construction only irrigation water will be used in these areas as needed to maintain the vegetated pasture. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makaawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.
Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiolii Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a wind model depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more stringer than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m3, well below the State standard of 150 μg/m3. The estimated concentration for PM2.5 is 0.23 μg/m3, well below the Federal standard of 35 μg/m3 (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be
dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai'i Dairy Farms": http://tiwurl.com/OEQCKAUA

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED-AP
Principal Planner

February 23, 2015

Dear Planning Staff members:

Most people on Kauai support agriculture if it is done right. If you really want to have a farm and you really want the support of the citizens, create a model that does not pollute the aquifer, does not use artificial chemical fertilizers, does not use GMO feed, and is sustainable. I would suggest an organic grass fed only beef cattle farm which puts the correct amount of animals on the land that the land can support. The beef would be in high demand for local residents who would be proud to support such a venture.

The idea of an extensive dairy operation producing excessive amounts of effluent and using chemical fertilizers that pollute the aquifer, streams, beaches and coral is something that many community members cannot support. The importation of GMO feed is questionable. Water pollution and the use of non-indigenous insects to control the flies would adversely affect the tourism industry and businesses and jobs in the Poipu area.

The obvious choice for Grove Farm is to work with the community and be a hero.

Best regards,

Tom Hennessy

cc: Group 70 International, Inc., Hawaii Dairy Farms LLC
Dear Tom Hennessy:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawaii. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. The State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawaii’s Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plach Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, machine operators, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

Although they occur infrequently, Kaua‘i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhā‘ulepū region during and following the hurricanes that affected Kaua‘i in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhā‘ulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua‘i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCs, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawaii’s Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plach Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, machine operators, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.
The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the tourist industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property values or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**
The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Måhå‘ulepū 14 well and the County's Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Måhå‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po‘ipu region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipu - Kalāhēo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

### Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Måhå‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Måhå‘ulepū watershed.

The HDF site is located on the bottom-end of the upper Måhå‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Måhå‘ulepū Road. This ditch, named Waipōlī or Waipōlī ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

### Potential Impacts from Construction

The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopōlī Ditch near the bridge accessing Makauwahī Cave Reserve in April of 2014. The group reported high levels of enterococci to the County. Complaints from the public citing the high levels of enterococcus in Waiopōlī Ditch and concerns about the proposed dairy prompted CBW to conduct a "Sanitary Survey" of the Måhå‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopōlī Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part 1 of its report: Waiopōlī Ditch Sanitary Survey, Kaua‘i, Part 1. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Måhå‘ulepū Valley. The dense canopy along the makai end of Waiopōlī ditch blocks ultraviolet rays, which could help reduce bacteria levels. (CBW noted that Waiopōlī Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations: Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top
Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waioli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the marine environment revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWBR, dairy neighbors and the local Kauai community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act
Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure
application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1.670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEOCKAUA

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

[Signature]

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Herb Herndon
1901 Poipu RD #232
Koloa, HI 96756
kahala232@aol.com

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā‘ulepu Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Herb Herndon:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**NATURAL HAZARDS:** The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhā‘ulepu property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai‘i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone. The Kaua‘i and Niihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands.
Although they occur infrequently, Kaua'i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhā‘ulepū region during and following the hurricanes that affected Kaua'i in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhā‘ulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua'i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area's hydrology is shaped by its geology. The Kōloa area was built by Nāpali formation lavas of the Wānena volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is overlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 105 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.
Through the waterbody in which the County well occurs is confined and established a 1,000-foot setback from the Kalani Fishponds, prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include silt fence installed and drainage ditches. The Kalani Fishponds, located adjacent to Waiopili Ditch, provide overflow to the Kalani River and are an important fishery and wildlife habitat.

The Kalani Fishponds is a man-made drainage channel and is not an inviting recreational body of water utilized by people. The State Department of Land and Natural Resources, in cooperation with the State Department of Health, has conducted water quality sampling at Waiopili Ditch and Kalani Fishponds. The Kalani Fishponds is a man-made drainage channel and is not an inviting recreational body of water utilized by people. The State Department of Health and the Waiopili Ditch Sanitary Survey, Kauai, Part I, found no significant impact to the ditch from any activity that could be attributed to the ditch. Fish and animal waste degrading organic debris and inputs impacted the ditch. The ditch along the Kalani Fishponds was created by the US Army Corps of Engineers in 2013. Additional practices that may impact the ditch are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices. hdf operations will follow the practice standards of the National Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Another setback restricts application of effluent within 50 feet of the drainageways.

Waiopili Ditch Sanitary Survey, Kauai, Part I

The Waiopili Ditch, located adjacent to Makauwahi Crater Reserve in April of 2014, is the major drainage channel and is not an inviting recreational body of water utilized by people. The ditch along the Waiopili Ditch was created by the US Army Corps of Engineers in 2013. Additional practices that may impact the ditch are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices. hdf operations will follow the practice standards of the National Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Another setback restricts application of effluent within 50 feet of the drainageways.

SURFACE WATER

The State Department of Land and Natural Resources, in cooperation with the State Department of Health, has conducted water quality sampling at Waiopili Ditch and Kalani Fishponds. The Kalani Fishponds is a man-made drainage channel and is not an inviting recreational body of water utilized by people. The State Department of Health and the Waiopili Ditch Sanitary Survey, Kauai, Part I, found no significant impact to the ditch from any activity that could be attributed to the ditch. Fish and animal waste degrading organic debris and inputs impacted the ditch. The ditch along the Kalani Fishponds was created by the US Army Corps of Engineers in 2013. Additional practices that may impact the ditch are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices. hdf operations will follow the practice standards of the National Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Another setback restricts application of effluent within 50 feet of the drainageways.

Another setback is a stormwater pollution prevention plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES).
only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā'ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). This nutrient run-off would not occur on chronic daily rainfall. Rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST
Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m3, well below the State standard of 150 μg/m3. The estimated concentration for PM2.5 is 0.23 μg/m3, well below the Federal standard of 35 μg/m3 (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawai‘i Dairy Farms": http://tinyurl.com/OEQCAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
To whom it may concern:

I am opposed to the proposed dairy farm in the Mahaulepu Area, Kauai due to its effect on air quality in the area in which I live, the Poipu area south of Koloa. Because of my proximity to dairy farms where I have previously resided, I am acutely aware of the effect on air quality of effluent holding ponds on areas downwind from the farm. In the case of HDF, we are located directly downwind from this facility due to the prevailing trade winds common to this area. Regardless of the feeding process of this proposed dairy farm, the milking area generates large quantities foul odor waste due to cattle elimination waste and the water used to remove it from the milking area.

Without highly effective water treatment facilities it will be impossible to control the odor emanating from this area. I question whether studies concerning the holding area for waste consider guarding against rains of the magnitude of those received by this area during March of 2006, amounting to approximately 40 inches for the month.

Your thoughtful consideration of these concerns will be greatly appreciated.

Sincerely yours,

Joyce W. Herndon
1901 Poipu Rd. Apt. 232
Koloa, HI 96756

May 26, 2016

Joyce Herndon
1901 Poipu Rd. Apt. 232
Koloa, HI 96756
joycehern@gmail.com

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhāʻulepū Road
Kauaʻi, Hawaiʻi

Dear Joyce Herndon:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

Your comments were received by the Department of Health Environmental Planning Office. The Department of Health forwarded a copy of your comments to Group 70 International in order to be included in the Draft Environmental Impact Statement (EIS) analysis. This letter was prepared in response to your comments.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**NATURAL HAZARDS:** The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhāʻulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas

Group 70 International • 928 Bakah Street, 5th Floor • Honolulu, HI 96813-4307 • tel. 808.523.5866 • fax. 808.523.5874 • www.group70int.com
Hydrology: The area’s hydrology is shaped by its geology. The Kīloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kīloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāulepū Valley and the HDF site ranges from 105 – 500 feet per day. The hydraulic conductivity of soils in the adjacent Kīloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable drinking water. Water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.
The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County's Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Poʻipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Poʻipū - Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relative high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahine Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococci in Waiopili Ditch and concerns about the proposed dairy prompted CBW to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CBW noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top
of drainerageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainerageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of 10,000 pounds per year); and one percent of phosphorus (totaling 900 pounds per year). The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient concentrations in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kauaʻi community.

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odor, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

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separate milking cycles – moving to and from the barn for the 10- to 15-minute
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Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to
the size of the non-pasture areas used by cows at HDF. Results were added to the
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the island of Kauai, and the total concentration was compared to the State ambient
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is likely odor detection beyond the HDF boundaries will be less frequent.
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impact would be negligible. The estimated concentration for PM2.5 is 2.01 μg/m3,
well below the State standard of 150 μg/m3. The estimated concentration for PM0.1
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This response letter accompanies your copy of the Draft Environmental Impact
Statement (EIS). The Draft EIS is available on the OEQC website at the following
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Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
John R. Hoff  
P.O. Box 547  
Koloa, HI 96756  

Subject: Hawai‘i Dairy Farms  
Environmental Impact Statement Preparation Notice  
Māhā‘ulepū Road  
Kaua‘i, Hawai‘i  

TO: Group 70 International  
925 Bethel Street, 5th Floor  
Honolulu, HI  
96813  

RECEIVED  
FEB 23 2015  
GROUP 70 INTL

Is Mahā‘ulepū a Particular* Landfill?  

Prior to any approval from government agencies allowing the Mahā‘ulepū area to be used as a site for a possible health hazard / water polluting dairy farm, or any other agricultural endeavors, this Kaua‘i resident recommends that an "independent civil investigation" be conducted concerning the possibility that environmental violations have occurred in the above mentioned area resulting in the creation of a clandestine "Solid Waste Disposal Facility"; commonly referred to as a "landfill".

Over the past decade and a half, both private (business) and public (government) sector's records indicate evidence that certain solid waste materials, namely Construction & Demolition debris (C&D) along with hazardous waste (asbestos & red lead paint), have been disposed of in un-supervised fashions. Such acts of possible circumvention of legitimate, best industry practices, are considered crimes; both civil and criminal, and need to be clarified. Why add more possible pollutants to an area that may already be polluted? Let's find the truth.

Not only does it create the possibility of exposing the Poipu - Koloa - Mahā‘ulepū area residents, vacationers, businesses, schools ...our children... to health and life threatening issues, such actions also deprives our County of Kaua‘i much needed revenues generated from tipping fees which support our government and our island. ALOHA.

John Hoff

* Def: "distinctive among others of the same general category"
Environmental Protection Agency related to concentrated feeding operations in the States. As noted previously, the HDF system is designed to utilize 100 percent of the feed required to maintain cows at the site. The term "grass-fed" was used in the HDF EISP. This term was intended to identify the use of the collective term "grass-fed," the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area "footprint" will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.1. Agricultural infrastructure and utilities required for the dairy operations will be provided by the irrigation system. The irrigation system is controlled using computer software and GPS receivers to allow the irrigation system to be managed or restored to reduce runoff, improve water quality, and exercise while they forage.

The cattle will be divided into paddocks as they roam the site. The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigation systems. The pivot irrigation system is controlled using computer software and GPS receivers to allow the irrigation system to be managed or restored to reduce runoff, improve water quality, and exercise while they forage.

The ef fluent is planned for the storage pond on a 30-day storage schedule for 699-cow dairy. Throughout the less than 30-day storage period, effluent is expected to be applied every four days, and the slurry application is expected to be applied every 65 days of storage for 699 mature dairy cows. The results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet; improvements in grass productivity are anticipated to provide up to 85 percent of the cows' diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as "mob"s, mimicking the natural social order of bovines. Cows spend 22 hours of each 48-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped pastures, walkways and races minimize the impact of drainage ways throughout the site. Existing vegetation within the setbacks will be mowed or restored to reduce runoff, improve water quality, and exercise while they forage.

The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance and fertilizer effectiveness, see Draft EIS Section 3.5.3, and Draft EIS Appendix D.
Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and the refuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

Hydrology: The area’s hydrology is shaped by its geology. The Kūloa area was built by Napali formation lavas of the Waima volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kūloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silt and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kūloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD) of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milk operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāulepū 14 well and the County’s Kūloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāulepū Valley, HDF established a 1,000-foot setback surrounding the Kūloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.
Regional Water Demand: The next 20 years will see a significant increase in the demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the number of people living in the County to increase by nearly 1 million gallons per day. A projection that the island population will increase by 172,000 people by 2035. The Department of Health (DOH) must account for this increase in demand to prevent a deficit and require commercial supplementation. Gray yields are anticipated to fall under the exemption for commercial supplementation.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and areas upstream, and initiated a series of investigations by the State Department of Health (DOH). The Sanitary Survey found no significant impact to the ditch from any activity that could carry particles into surface waters. Fences will be erected 35 feet from the top edge of drainageway (totaling 70 feet in width) to keep cows away from surface waters. Another setback restricts application of effluent within 50 feet of the drainageway. Only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Lungmen Quesitons. Settlers and holdiers. Normal ongoing firming and machining practices are exempt from the Clean Water Act (CWA). The National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and buffer and pasture grass, keeping nutrient applications away from waterways.

Potential Impacts from Construction: The dairy facility and associated infrastructure could carry particles into surface waters. Fences will be erected 35 feet from the top edge of drainageway (totaling 70 feet in width) to keep cows away from surface waters. Another setback restricts application of effluent within 50 feet of the drainageway.

NUTRIENT SOURCES: Agricultural activities are expected to drop from 3 tons per acre per year to 1 ton per acre per year. The project area is located in the Waipio Valley Water Resources District, U.S. Army Corps of Engineers (USACE) in 2013. Additional ridge. These normally dry streams converge into man-made drainageway, running through the HDF site across the valley floor, and meets a concrete drainageway (totaling 70 feet in width) to keep cows away from surface waters. Only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass. The Dairy Facility and associated infrastructure are expected to contribute nutrient sources of 1 ton per acre per year. The project area is located in the Waipio Valley Water Resources District, U.S. Army Corps of Engineers (USACE) in 2013. Additional ridge. These normally dry streams converge into man-made drainageway, running through the HDF site across the valley floor, and meets a concrete drainageway (totaling 70 feet in width) to keep cows away from surface waters. Only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass.
increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Pōʻipū region were also calculated. Nitrogen input to the marine environment in the Pōʻipū region is calculated to be 38,510 pounds annually, or 35 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pōʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipio Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”:

http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
February 15, 2015
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, HI 96813

To Whom It May Concern:

My name is Maureen Holt. My husband Howard and I founded Trustile Doors Inc. in Denver Colorado in 1995. Trustile is an MDF door manufacturer. MDF is a product made from wood dust and compressed into sheets that are cut and styled into doors. It is an environmentally green product. We built a state of the art 50,000 square foot plant and we burned our waste to create the energy we needed to run our equipment. The air quality leaving our plant was actually cleaner than the air coming into our facility. We provided a safe workplace and created 168 American jobs. We sold our company and in 2006 we moved to Kauai.

We had vacationed in Kauai 7 different times before the actual move. We loved Kauai for its weather, natural beauty, and its lifestyle. We purchased a home in Kolua Estates on the South Shore of Kauai near the world famous Poipu Beach. The air and water quality are much better here than that of the mainland Howard breathes easier here and doesn’t have to take as much medication for his Asthma. The warm weather is easier on me with my arthritis and lower back pain. It is a great place to live. We spend most of our time outdoors while our friends and family on the mainland have to live indoors during the cold winter.

We are extremely concerned about an industrial sized dairy coming to our island. On the mainland dairies are usually located off busy highways on huge parcels of land away from housing developments and pristine coastlines. We have driven by dairy farms and had to hold our breath due to the odor caused. Dairies are notorious for bringing in flies. One expert that happens to live on the north shore of Kauai stated there would be one billion flies. The odor and the flies would ruin our quality of life here. We like to eat outside, enjoy swimming in our pool, gardening and playing Frisbee with our labradoodle Rosie. We will have to invest in expensive air conditioning instead of enjoying the cool trade winds and shut our windows to avoid the odor and the constant buzzing and biting flies. It is estimated that our property values could drop as much as 40% which would affect the property tax revenue base for the county. Our house is paid in full and we would have to walk away from our investment, most people have loans and would walk away from what they paid leaving the bank their home.

The dairy is only going to create 15 jobs and it has the potential to completely destroy tourism on our beautiful South Shore. Tourists are not going to spend all the money it takes to get here to smell cow dung and eat flies. The amount of jobs lost if tourism drops could be in the thousands. Kauai depends on tourism for its sustainability. The Grand Hyatt hotel has filed a lawsuit against the dairy. The Hyatt has already lost business since conventions are booked years in advance and just the threat of an industrial sized dairy coming in such close proximity to the Hyatt has caused businesses to find other locations for their conventions. The Hyatt was planning to expand its location to add more hotel rooms to the south shore which would create more jobs for the largest employer on the island. The Hyatt is a good steward of the land and keeps the grounds very pristine and welcoming, and is an excellent company to work for. Our son works for the Hyatt in Beaver Creek Co. and he loves his job.

The Hawaiian people want to be good stewards of the land their “inau, homa” and keep it for future generations. There are several significant sites that are considered sacred and need to be undisturbed by the dairy. The waste from the dairy could destroy already endangered plants, birds, coral and several species of ocean life.

We are concerned about the dairy location only 750 feet from our wells for our drinking water. We feel the amount of waste generated by the industrial dairy will make our drinking water unsafe, due to the large amount of urine and manure left on the grazing land.

The dairy is modeled after dairies in New Zealand and we just need to look to what has happened there and realize this is not right for Kauai. The beaches there are not black sand they are black from manure deposits with swimming and fishing becoming a thing of the past.

Dr. Carl Berg of Surf Rider has tested the water quality and it is already polluted with human and animal waste and the Department of Health agrees with their findings. We need to find the sources of the pollutants and see that Steve Case the owner Grove Farm cleans up the water prior to a dairy being established on the site. The Friends of Mala‘ulepu offered to put up signs on the beaches to discourage swimming in the polluted water and Grove Farm refused to post the signs. They don’t want to discourage tourism, however there is a health risk associated with swimming in the polluted water.

We believe in the American dream and Peter Omidyar created a great thing with EBAY. We as previous business owners commend him on his success; however leasing the land from Grove Farm to build an industrial sized dairy is a really bad idea for Kauai. Peter needs to create jobs at the same time take care of the environment and not affect surrounding communities. His legacy should be to improve the quality of life here on the island.

We want to trust that our government officials will protect us against the damaging effects this dairy will cause our island. We believe the Environmental Impact Study will prove that this site is unsuitable for and industrial sized dairy. We are so blessed to live in such a desirable place, let’s keep it that way for future generations.

Sincerely,
Howard F & Maureen C. Holt
3051 Pua Akala Place
Koloa, HI 96756
May 26, 2016

Howard & Maureen Holt
1061 Pua Alala Place
Koloa, HI 96756
hholt@hawaii.rr.com

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhāʻulepū Road
Kaua‘i, Hawai‘i

Dear Howard & Maureen Holt:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhāʻulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed.” The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed,” the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, including storage tanks and silos, effluent storage ponds, livestock water systems, and irrigation systems. The dairy facilities will include drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāʻulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diets; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diets.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob,” mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and the energy expended by the mature dairy cows as they graze are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways

Howard & Maureen Holt
May 26, 2016
Page 2 of 15
and cows. These are designed to provide a comfortable path under hoof. The other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and fossil fuels in Hawaii and promote sustainability. This will reduce the need for feed that is not sustainable. A high-quality diet will ensure optimal weight gain and productivity.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of animal care to minimize stress and ensure optimal health. Antibiotics may be prescribed as needed for treatment of illnesses. Adherence to guidelines for the use of antibiotics approved by the Food & Drug Administration (FDA) will be followed. Healthcare will include laboratory tests for traces of antibiotic residue, routine Bovine Acid Stool, and Cow Milk Test (AML) and Cattle Identification (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

ARCHEOLOGICAL AND CULTURAL: The Hawai'i Dairy Farms (HDF) project is subject to a historic review, as well as a State Department of Land and Natural Resources, State Historic Preservation Division (HRS) review of archaeological and cultural resources, with technical studies in Appendix G and H. A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area. Six historic properties are within the project area and six sites occur in the extended survey area. One of the sites is believed to be associated with pre-European settlement, and four of the sites are believed to be associated with the many Land Commission Awards in the project area were not successfully identified as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic byproducts, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, and timing of nutrients applied to the land to meet the crop's nutrient requirement for optimal growth, yield, and quality. Recommended rates are based on soil tests and crop needs. The timing and application of nutrients can be controlled to provide immediate benefits, such as increased crop yields, and sustained benefits, such as improved soil fertility and water quality. The effluent storage ponds are designed to accommodate 30 days of storage for up to 120,000 head of cattle, and 45 days storage for up to 60,000 head of cattle. The effluent from the ponds is planned for application to the pasture on the dairy farms. The ponds are designed to have a 20,000-cow capacity and nationwide 30-day storage period, with a load of at least 700-cow capacity for every 10 days, and a load of at least 700-cow capacity for every 30 days. The ponds are designed to have a 20,000-cow capacity and nationwide 30-day storage period, with a load of at least 700-cow capacity for every 10 days, and a load of at least 700-cow capacity for every 30 days.
Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kauai may overfly the site. The endangered Hawaiian goose, nēnē was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kōloa area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē gosse collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to project-specific areas, marking tall structures and fencing with white visibility polytype, limiting nighttime lighting, and shielding any outside lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammal species.

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhāulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenhouse fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila mu сбор, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-‘ōhi‘a forests.

Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AE COS Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened or proposed for listing under Federal or the State of Hawaii’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plant species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhāulepū Valley.
Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate indirect full-time equivalent jobs on O'ahu, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O'ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai'i.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

In the Kōloa-Poi'pū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ah Kinoi Road between Kōloa and Poi'pū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animals wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai'i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua'i, and 8 on O'ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua'i.

The HDF project would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai'i Island), approximately 10 percent of Hawai'i's milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on O'ahu, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O'ahu.

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GROUND WATER: Hydrology: The area's hydrology is shaped by its geology. The Kōloa area was built by丕 option formation lavas of the Waimea volcanic series. Surface lavas of the丕 option formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with
The groundwater and surface water analysis conducted for the Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The results demonstrate the ability of soils to transport water given a hydraulic gradient and are expressed in units of feet per day. It is a measure of how easily water will move within the soil system. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

Groundwater in the alluvium will not impact the County drinking water well. Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Permit. The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Mahlu‘upal Bailey 14 well and the proposed dairy site, will result in no adverse impacts on the existing groundwater system. Groundwater in the alluvium will not impact the County drinking water well.
Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makaawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” [http://health.hawaii.gov/cwb].

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways;

only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 1.62 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily discharge; rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 14 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal
area. Water chemistry measurements made by MRCl identified mixing of ditch water occurs rapidly and within a short distance of the shoreline. The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CBW, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. ER sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1 Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milk cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of the panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.
Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawaii Dairy Farms”; http://tinyurl.com/0EOCKAUAJ

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Jens Houby  
1901 Poipu Rd. #611  
Koloa, HI 96756  
jghouby@gmail.com

Subject: Hawai‘i Dairy Farms  
Environmental Impact Statement Preparation Notice  
Māhāulepū Road  
Kaua‘i, Hawai‘i  
TMK: (4) 2-9-01003:001 portion and 006 portion  
(4) 2-9-003:001 portion

Dear Jens Houby:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of EU99, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**GROUP 70 OBJECTIVITY:** Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai‘i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai‘i Revised Statutes and the “Environmental Impact Statement Rules” (Chapter 200 of Title 11, Hawai‘i Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State and Federal agencies. On numerous past EIS projects, the Hawai‘i Chapter of the American Planning Association has recognized Group 70’s professional work with Chapter awards for excellence in environmental planning. Part of the EIS scoping process involves Group 70’s experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai‘i Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a win rose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

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**DUST**

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

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cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM$_{10}$ is 2.01 μg/m$^3$, well below the State standard of 150 μg/m$^3$. The estimated concentration for PM$_{2.5}$ is 0.23 μg/m$^3$, well below the Federal standard of 35 μg/m$^3$ (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

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This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawaii Dairy Farms”: [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
February 10, 2015

Group 70 International, Inc.
925 Bethel Street, Fifth Floor
Honolulu, Hawaii 96813
Jeff Overton, Principal Planner

Re: Hawaii Dairy Farms Environmental Impact Statement

Dear Mr. Overton,

My wife and I reside in Poipu, Kauai, approximately 6 months out of the year and we want to provide our deepest concerns regarding the Hawaii Dairy Farm (HDF) proposed for construction in the pristine area of Mahulepu located in the SE coastal area of Kauai County.

While we realize that Hawaii desires additional economic drivers for its economy, this cannot come at the certain degradation to its environment and protected wildlife. This is particularly true when the benefits are miniscule as compared to the considerable negative impacts this non-critical business venture would certainly bring to this beautiful and highly regarded tourist and resort area of Poipu.

We are asking that the Hawaii Department of Environmental Protection and the Hawaii Department of Health thoroughly evaluate and at a minimum require very strict stipulations for this operation.

As to how this operation would negatively impact us personally and directly (and others like us) is the high probability of it causing health issues. Both my wife and I are retired and she has an impaired immune system that makes her highly susceptible to infections – particularly sinus infections. The reason we purchased a home in Kauai (and Poipu in particular) is its pristine conditions – most notably its air. The location of a potentially high density dairy operation less than 3 miles upwind of our home would create a host of health issues for people with upper respiratory and sinus conditions that visit here for the benefits of breathing pristine salt air carried in by the prevailing northeasterly trade winds. These trade winds travel thousands of miles unencumbered by human interference and pollution. These conditions would be considerably degraded and in our case could lead to my wife catching infection from microscopic particles carried in on the trade winds from the dairy. If this happens we will be forced to try and sell our property (no doubt it will be worth less than we paid for it 10 years ago) and relocate to another area. Because we are retired and planning to spend more time in Kauai, the fate of this HDF will have a significant impact on our future plans as well as the well-being of my wife. My wife’s infectious disease doctor in Denver (as well as her ear, nose, and throat doctor) recommends that we consider living in Poipu full time due to its pristine conditions and the noticeable improvements in her health when we are on Kauai.

We have spent most of our adult lives in the Denver metropolitan area and even though we are over 50 miles away from similar dairies as the proposed HDF, when the wind shifts to the NE the odors from the dairies are overpowering even in Denver. I personally spent 2 decades working on projects close to several dairies in Weld County (that I will not name), but several are located near Platteville, CO. I can say firsthand that the stench from the dairies on certain days was overpowering. Those days (fresh rain, high humidity, and warm temperatures) made working near the dairy unbearable. While these conditions are few in number in the high arid conditions of Colorado, they are an everyday occurrence at the proposed site in Mahulepu. I will barely address the proliferation of insects at dairies in Colorado except to say, when working near the dairies my crew and I could not eat within a mile of the facility without sitting in our trucks with the windows rolled up and the air conditioning on or otherwise
daily hatching flies fresh from eating manure and feasting on the green slime of the catch ponds would invade us and land on our lunches making them inedible. Conversely, people(residents and tourists) come to Poipu to eat fresh seafood outside and enjoy the views and smell of gardens and the salt air....NOT the stench from the catch ponds at the proposed dairy and be continually irritated and potentially harmed by disease carrying flies (and mosquitoes as well).

The bottom line is unlike the pastoral setting of cows grazing in a field that Group 70 purposefully put on the cover of their document to present a perceived peaceful ambiance for their project, a working dairy is a dirty, smelly, disease ridden place where crew wear knee high rubber bogs, arm length rubber gloves, walk around in ankle deep filthy sludge and wear masks to protect their lungs as it is a very unhealthy place to be around or even be near.

Dairies should not be positioned near any populated area as many studies have shown. We would respectfully ask the DOH and HEPA to consider these issues as well as several other points that were glossed over or completely ignored in the preliminary document provided by Group 70 regarding the proposed HDF:

1. Soil conditions - as a licensed engineer with a minor in geology and 40 years working with geologists I can say that soil conditions in any large area is highly variable and is certainly not homogenous. Therefore, we would request that a more thorough and rigorous soil analysis be performed of the dairy site including multiple soil samples taken at various depths in a multitude of areas before reaching any conclusion about whether or not the soil would have enough permeability to transmit effluent urine and feces residue down to groundwater. In an area of 570+ acres there will no doubt be areas where the clay content is limited to minimal and will allow percolation of contaminated fluids into the groundwater. But at the same time, high clay content in other areas will hold fluid and result in significant run off of fluids downslope to the ocean. What will be the plans to prevent this and what is the penalty when this inevitably occurs? Pay a fine for continuing to pollute?

2. Along the same vein, there needs to be a data driven monitoring set of processes to insure no contaminated effluent gets to groundwater such as drilling monitoring wells along the perimeter of the property as well as wells offsetting the “effluent catch basins” to insure they are not leaking. Likewise, the design and construction of these “catch basins” need to be clarified including how (and with what they will be lined) and how much head board (bem) will be included to insure they will not be overrun when extended heavy rains occur.

We are incredulous that there will be county and private potable drinking water wells located within 750' from this operation. A study as to fluid transport through this type of soil has to be required including transmissibility rates and directionality. Potable drinking water on Kauai (as well as the other islands) is priceless...just check ask Molokai!

3. A detailed plan regarding dust particulate mitigation is needed and not just during the construction period. More importantly will be continual mitigation efforts during the permanent operation when equipment is continually moving in and out of the facility relocating cases around the facility, bringing in other needed farming and milking equipment, daily transportation of the milk to its final processing plant. Group 70 did not mention that the limited road infrastructure into this area is dirt.

4. A detailed cost/benefit analysis is needed to measure the benefits of this dairy (how many actual permanent jobs will be created and expected tax revenues) vs. several scenarios of estimated reductions in tourist traffic (and loss of established permanent jobs to hotels and homes that are seasonal vacation rentals) due to the odors
originating just 2.5 miles upwind of one of the two largest tourist destinations on Kauai. Once word gets out regarding the odor problem in Poipu, the average tourist will choose to spend his/her vacation elsewhere.

5. In addition, a larger and more specific data set should be required regarding current occupancy rates of residences at Poipu. The vague statement that 56.2% of the housing units are vacant does not appear current or factual. How was this one number derived and where did it originate?

6. From first hand observation the Hawaiian Monk Seal and Green Sea turtles reside in the waters and beaches ½ mile downslope from this proposed operation. Also, the threatened and endangered (T&E) Humpback whale frequents the waters on this side of Kauai. These specific animals (along with lots of large sea birds) are seen daily in this area. The EIS needs to provide protection for these sea creatures from any potential damage to their habitat from contaminated run off that could occur during monsoonal rains and floods such as the “40 days of rain” that occurred in the Koloa and Poipu area a few years back. Also protection is needed to prevent birds (particularly T&E fowl) from landing in the filthy and disease ridden “catch basins”.

7. It is a faulty argument to equate historic sugar cane production that ended decades ago as equivalent to a high density dairy operation. Tons of sanitary waste (urine and feces) were not created with these operations and the cultural aspects of the area (including the extremely rare Makawahi Cave) were unknown when these operations began. Now we know that this particular cave is very rare and holds tremendous palaeoecological and archaeological data and has been described as “maybe the richest fossil site in the Hawaiian Islands and perhaps in the entire Pacific Island region”. The area around this site has been painstakingly improved and is becoming a favorite visiting site for locals and non-locals to visit and learn about the ancient history of this area. This area is directly offsetting the HDF to the south and will be severely impacted by foul odors emitted from the dairy.

Data is needed in the EIS referencing similar high density dairy operations in a “tropical environment” loaded with cultural artifacts and what measures are needed for a setting such as Makawaha Valley.

8. Finally, even though this is referred to as a “zero discharge” facility which sounds nice, but in reality means all the manure and urine stay on-site...that is TONS and TONS of it. As Group 70 boasts the tons of cow manure will be spread throughout the property to fertilize the grass. Assuredly that much manure when it is spread back as fertilizer is quite a large point source of odor. With a little rain, the smell is horrific.

My personal experience from being around dairies is grazing cows (often in groups of 20 or more) urinating and defecating when they feel like and where they feel like it. If you have witnessed cows urinating and defecating first hand, it is not a small volume of urine or feces and certainly not a pleasant event to smell. How will all of this waste be handled? Will it be gathered daily into a pile? What about the urine? All of this will provide opportunity to potentially damage to groundwater in the high permeability areas and, of course, the odor emissions when the herd reaches 2,000 cows will be significant.

While quite a bit of statistical data was included in the notice from the Group 70 regarding the amount of milk that the HDF would produce, nothing was included regarding how much urine, manure, belching and flatulence would be produced daily and the resulting methane (greenhouse gas) that would be released into the atmosphere. Published data support that cows emit a massive amount of methane through belching and flatulence. Statistics vary regarding how much methane the average dairy cow expels but some say it’s up to 500 liters (132 gallons) per day or an amount comparable
to the pollution produced by a car in a day. While the Group 70 report refers to HDF using a "smaller" "kiwi cross cow'', the difference in size is primarily in height not girth and the weights are nearly identical. The "kiwi cross cow'' is a hybrid of a cross breed of Holstein and Jersey cows. Coincidently, in New Zealand a tax proposal on dairy cow flatulence has been considered and the "kiwi cross'' dairy cow is used almost exclusively there. Please note the photo of a herd of "kiwi cross'' dairy cows below.

In conclusion, with all due respect to the HEPA and the HDOH, simply requiring "Best Management Practices'' as part of the permit approval process will not prevent breaches and lapses in the HDF daily operating practices. One only has to do a case study on permitted facilities to see citation after citation issued for infractions where permit BMPs are continually violated. This often results in protracted legal battles over fault; arguments over the magnitude of the violations and after much time passes minimal fines are sometimes collected. This does little to correct the environmental damage done. How this will be handled will need to be part of the EIS. A suggestion is that the DOH and HEPA have personnel on island and in the immediate area to monitor the operation and issue citations quickly when infractions occur...in the real world, self-monitoring and self-reporting simply does not work.

We respectfully ask that all these factors be given serious consideration during the EIS preparation and review process.

Sincerely,

David and Linda Howell
1568 Po'e Road, #212
Kapaa, Hawaii 96756
Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā'ulepū Road
Kaua'i, Hawai'i

Dear David & Linda Howell:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai'i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā'ulepū Valley on the island of Kaua'i to produce fresh, locally available nutritious milk for Hawai'i families. The rotational-grazing method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a "zero-discharge, grass-fed dairy". The term "zero-discharge" under the U.S. Environmental Protection Agency related to concentrated feeding operations (CARO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows' manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term "zero discharge" as it was construed as no nutrients into the system.

The term "grass-fed" was used in the HDF EISP PN. This term was used to identify HDF's intent to utilize a locally-produced feedstock - grass - for more than 70 percent of the dairy herds' diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of "grass-fed". The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of "grass-fed", the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area "footprint" will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock - grass - as the herd's primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient "dry matter" grass yields essential to a cow's diet. Additional project-specific trials at the Māhā'ulepū site on Kaua'i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows' diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as "mob", mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The...
Animals in various stages of lactation and rest will be transferred between HDF and cows' primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, benefit both the dairy and infuse the beef market in Hawaii with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven't given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management practices and pasture model applied by HDF maximizes grass as the primary nutrition source and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, animals to minimize stress and ensure the herd's welfare. A licensed veterinarian will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow operation. The committed herd size of 699-cow dairy, and nearly impossible for the committed 699-cow operation. For more information on nutrient balance implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction of nutrient balance, water quality, and wildlife protection. Soil conservation is a critical component of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed approach using science-based tools and standards in agronomy, properties and weather conditions. For more information on nutrient balance, water quality, and wildlife protection. Soil conservation is a critical component of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed approach using science-based tools and standards in agronomy, properties and weather conditions.
the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soil classifications and descriptions provide a good information base, however, in-field soil testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalihi Clay at 32 percent, Ka‘ena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen, phosphorus, calcium, magnesium, and potassium.

Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrate to gaseous forms, which reduces the potential for impacts on waterbodies. In this way, “poorly drained” soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than “well drained” soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai‘i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing season. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

ARCHAEOLOGICAL AND CULTURAL: The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-10-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic-era cultural materials associated with the many Land Commission Awards in the project area were nonexistent, as explored through survey and subsurface exploration. The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhā‘ulepū Abu’a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-10-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the
exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

**DEMOGRAPHIC AND ECONOMIC** The potential impacts of Hawai’i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County annually by selling 699 cows, 40% cow herd, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

Hydrology: The area’s hydrology is shaped by its geology. The Kāloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kāloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley and the HDF site ranges from 105 – 500 feet per day. The hydraulic conductivity of soils in the adjacent Kāloa-Poʻipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic
material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deeper aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaii’s Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site well, existing Māhā'ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā'ulepū 14 well and the County's Kāloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā'ulepū Valley, HDF established a 1,000-foot setback surrounding the Kāloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animal manure will deposit masure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the volcanic aquifer layer, which is the source of potable water. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors, and the local Māhā'ulepū community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DREDT) projects the population of Māhā’ulepū will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa-Po‘ipū-Kālihea districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā’ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā’ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā’ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hā‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā’ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed on a 10-acre site located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Mākawahi Cave Reserve in April 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā’ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā’ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could...
be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Library" (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce run-off that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways. Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kēōkea-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 36,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua’i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations...
were modeled, as currently there are no cows on-site. The EIS sections 4.19 and 4.25 of the DEIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 64 hours per year, within an area that extends approximately 1,670 feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet (just under half a mile) beyond the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological conditions (low wind velocity / mixing), and all odors detected by 50 percent of the sensitive population value (the threshold of perception). The odor quality standards are defined by the point at which 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be detected by 50 percent of the sensitive population within an area that extends approximately 1,670 feet (within one-third of a mile) beyond the HDF boundary, again not reaching recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows would not extend beyond 2,780 feet (just under half a mile) beyond the HDF boundary (just over half a mile), again not reaching residential or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological conditions (low wind velocity / mixing), and all odors detected by 50 percent of the sensitive population value (the threshold of perception). The odor quality standards are defined by the point at which 50 percent of the panelists can detect the odor.

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This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

Re: COMMENTS ON HAWAI'I DAIRY FARM'S ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE, DATED JANUARY, 2015.

Aloha,

I have very serious concerns about the proposed dairy at Mahaulepu Valley on Kauai. I am glad that an EIS will be prepared and hope that it will address the many issues, environmental, social and cultural, that a dairy in this location presents. While HDF states they are voluntarily doing this process, to truly be pono, this should have been done well in advance of any infrastructure changes or the announcement that a dairy IS going in at this location, as the EIS is designed to determine whether a project like a dairy should go in by providing substantive data that indicates that it will not be environmentally, culturally or socially harmful.

NUMBERS

Beginning with the proposed herd and the recent “reduction” in herd size to 699 (a significantly chosen number as 700 cows is classified as a Large Confined Animal Feed Operation). What is not noted by HDF with this revised herd size is that those 699 cows will be shipped in pregnant, thus there will be double that number after gestation. Males will then be thinned out through outsourcing and killing of a certain amount, so that 699 would be about 900 cows on the land after gestation. Regardless of this claim of a reduced herd size, the EIS must evaluate the plan based on the proposed final herd size of 2,000.

WASTE

According to the EPA, waste estimates for dairy cattle are equivalent to 164 times the amount of humans, thus the 2,000 cows would produce waste equivalent to approximately 328,000 people, fully 5 times the population of the entire island. Microorganisms causing health risks to humans like E. Coli, enterococcus and leptospirosis are common in the feces of cattle, these organisms could likely end up in the adjacent streams leading to the ocean as well as groundwater.

SOIL

HDF should be required to do a detailed, accurate soil survey to determine once and for all if the soil is able to handle the amount of waste that will accumulate and be applied via airborne spray as fertilizer. Again, had HDF followed proper protocol and done an EIS at the outset, perhaps they would have provided more accurate information on the soil in the area in question. Their initial plan stated that soil in the area was porous volcanic, which it is not. A later NRCS survey of the soil indicates that most of it is primarily clay with “very limited” capability to handle manure load and has a high potential for runoff.

DRINKING WATER WELLS

HDF should be required to do an extensive groundwater study to assess effects of waste applied to the soil. Their current Waste Management Plan does not identify all of the nearby drinking water wells and misrepresents the distance of some of those that are identified on the map. Most significantly, one well (Koloa F) is very near to the area in which their wastewater treatment...
The plant will apply the sludge that accumulates in the ponds.

AIRBORNE CONTAMINANTS
HDF plans to spray waste from the effluent ponds on the fields as fertilizer. These spray machines are very tall and with dominant trade winds the possibility of spray affecting homes and businesses downwind is a potential problem. The EIS should address airborne contaminants produced by the dairy and the environmental, health, and social impacts.

SOCIAL CONCERNS
The Mahaulepu area is popular for nature oriented activities and subsistence such as fishing, hiking, beach-going activities, bird watching and more. The EIS must address how these activities would be impacted by environmental effects from a large dairy of this size upstream of the beach-going area.

The Koloa/Poipu area is home to approximately 3,000 residents, all of whom will be downwind of the dairy and thus affected by any airborne contaminants or odor. The area is also one of the top 3 visitor destinations, providing significant income to both County and State through property, TAT, general excise and other taxes. Environmental air, water and vector control concerns from the dairy would reduce property values and make the area less desirable to visitors. The largest private employer for the island is within 2.5 miles of the proposed dairy and a thriving visitor industry encompasses the entire Koloa/Poipu area, a decrease in visitors to the area would adversely affect those employees thus causing loss of jobs and income for island residents. Reduced property values and visitors to the area would not only affect the local economy through loss of jobs/decreased incomes for residents, but reduced revenues for the State and County as well.

The above noted concerns should all be fully addressed by the EIS for Hawaii Dairy Farm’s proposal at Mahaulepu Valley. Given the open, available, leasable land on the island, particularly that owned by lessor Grove Farm, this seems to be one of the most ill-suited locations for such an operation. Its proximity to freshwater sources, the ocean, nearby homes and businesses makes this an extremely poor location for a dairy, especially given that all milk will have to be trucked to the port in Nawiliwili for shipment to Oahu for processing. The above noted environmental, health & social concerns in addition to this fact render this a plan that will negatively impact the environment and economy of Kauai.

Mahalo for your careful consideration of my concerns and your diligence in evaluating the impacts of this project.

MARISA HURLEY
Director of Events
Grand Hyatt Kauai Resort & Spa
1571 Poipu Road, Koloa, HI 96756 USA
+1 808 240-6331 BUSINESS
+1 808 240-6598 FAX
Marisa.Hurley@hyatt.com
e-brochure | www.grandhyattkauai.com

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May 26, 2016

Marisa Hurley
157 I Puupu Road
Koloa, HI 96756
marisa.hurley@hyatt.com

Subject: Hawai‘i Dairy Farms

Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i

Dear Marisa Hurley:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will consider the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 21, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed.” The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed,” the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 65 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs,” mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways
and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflect in the title of the livestock waste guidance for Hawaii is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, method of application of plant nutrients, and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāʻulepū site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

**ARCHAEOLOGICAL AND CULTURAL:**

The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6 E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-10-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic-era cultural materials associated with the many Land Commission Awards in the project area were non-existent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burial, and no bones
were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhāulepū Ahupua'a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai'i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O'ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i's economy, which is heavily based on the visitor industry. With only two dairy operations remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and projected impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napale formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick...
Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalaheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-lend of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hā‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waipōli Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; geo текстиль filter fabric and sediment logs around drain inlets.
Surface Water Quality: The Kaua'i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Māhāulepū Cave Reserve in April of 2014. The group reported high levels of enterococcus to the Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted DOH to conduct a “Sanitary Survey” of the Māhāulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2015. Agricultural practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 1.62 tons DM per acre to 20 tons DM per acre. Section 423 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge to the channel when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times greater than the estimated potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipouli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean...
water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kauai community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EB sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act
Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST
Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kauai, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR
Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,570- feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were
intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai'i Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

-----Original Message-----
From: Kapua Janai [mailto:kapuajanai@gmail.com]
Sent: Monday, February 23, 2015 4:46 PM
To: EPO
Subject: EIS for Hawaii Dairy Farms

I am greatly concerned about the potential affects of the proposed Hawaii Dairy Farms project which need to be carefully examined, as the project could create irreparable damage for the island of Kauai, environmentally, financially, and culturally.

I am a resident of Kauai, and have been working at the ANARA spa at the Grand Hyatt for 15 years, in the immediate vicinity of the proposed project. I ask that the study be designed to address all of the following issues.

- It is crucial that the EIS be conducted in an honest and in depth manner. It therefore should be done by an independent organization. Since Group 70 International has already been working with the HDF group, it is possible that they would be biased in their favor. It has been said, and rightly so, that it is possible to set up a study to prove what you want it to prove. Thus it is important that it not be set up to study to prove what you want it to prove. Thus it is important that it not be set up with a pre-determined bias. Performing the study should be done by some organization not already connected to HDF.

- In the overall plan for the county of Kauai, it has long been designated that Po'ipu is the primary tourist destination area. People arrive here from all over the world to experience our environment of sunshine, clean air, beautiful beaches, and swimable ocean. This area currently provides an abundance of hotels, condos, beaches, restaurants, and shopping. They will not continue to come here if their experience is one of the stench of cattle, manure, insecticides, or pesticides, or the pestering presence of flies, or an ocean that is polluted by run-off of chemicals, urine, and manure. They will not want to be driving behind cattle trucks transporting a load of cattle to various temporary pastures. Kauai is a tourist dependent economy. The number of people employed by all of the tourist dependent businesses in the Koloa-Po'ipu area far outweighs the number of people who would be employed by HDF. There are thousands of people dependent for their living on maintaining a clean, healthy, tourist-attracting environment. It is not right to endanger all of these for the profit of a single new business wanting to come in. The EIS must safeguard this community.

- Careful consideration should be given to finding a more suitable location for such a project than this one which is close and upwind from our major tourist area, and extremely close to sea level and shoreline.

- Kauai is fortunate to have one of the most beautiful and unique natural environments on the planet. It is a fragile ecosystem, so easily damaged. Any and all who are privileged to live here should hold it among their highest priorities to be the caretakers of this place, maintaining its health and protecting it. In this situation we are counting on those doing the EIS to assist us in preventing environmental damage, because once done, such damage is difficult, costly, and often impossible to reverse. I have read some of the other letters being sent regarding this issue, so I know that the particular details which need to be addressed are well documented. What I want to stress is that those doing the EIS must take seriously the potential impact this project could have on our precious Kauai.

- There also seems to be contradictory information being given about regarding the supposed benefits this project would bring. There is reference to supplying Kauai's families with a local source of milk. Yet elsewhere I have heard that HDF plans to sell most of the milk in the Far East. In some places they speak of grass-fed cows, yet elsewhere I have heard that they plan to use GMO corn to supplement the diet. So if there is any milk made available to Kauai, it will be contaminated with GMOs. If the current study aims to weigh the benefits and detrimental effects, these facts need to be checked out to see what the real situation is.

I surely hope that all of these matters will be strongly considered in designing this study. Thank you for your consideration.
May 26, 2016

Kapua Janai
Kapuajanai@gmail.com

Subject: Hawai’i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhāulepū Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Kapua Janai:

Your comments were received by the State of Hawai‘i Department of Health Environmental Planning Office. The Department of Health forwarded a copy of your comments to Group 70 International in order to be included in the Draft Environmental Impact Statement (EIS) analysis. This letter was prepared in response to your comments.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the expanding of the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**GROUP 70 OBJECTIVITY:** Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai‘i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai‘i Revised Statutes and the "Environmental Impact Statement Rules" (Chapter 200 of Title 11, Hawai‘i Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State and Federal agency. On numerous past EIS projects, the Hawai‘i Chapter of the American Planning Association has recognized Group 70’s professional work with Chapter awards for excellence in environmental planning. Part of the EIS scopes process involves Group 70’s experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai‘i Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

**PESTS:** A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhāulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11.

A project location does not provide any habitat for *Drosophila musaphila*, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-‘ōhi‘a forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which bury manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhāulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pads in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.
In the Kōlōa-Po'i-pu region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ahu Kinoiki Road between Kōlōa and Po'i-pu, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animals wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai'i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua'i, and 8 on O'ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua'i.

The HDF project would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai'i Island), approximately 10 percent of the island's milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua'i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O'ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons ($36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai'i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua'i, and 2 indirect jobs on O'ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua'i and another 8 indirect jobs on O'ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER:**

**Hydrology:** The area's hydrology is shaped by its geology. The Kōlōa area was built by Nāpali formation lavas of the Waimea volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā'ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōlōa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material which is buried beneath thick alluvium that covers the valley floor; and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā'ulepū Valley and the HDF site ranges from 0.5 – 50 feet per day. The hydraulic conductivity of...
soils in the adjacent Kōloa-Po'ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā'ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water-quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā'ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā'ulepū 14 well and the County's Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā'ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kaloha districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā'ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā'ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā'ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hā'upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā'ulepū Road. This ditch, named Waipōli Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waipōli Ditch near the bridge accessing Makanawahi Care Reserve in April of 2014. The group reported high levels of enterococci to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore...
Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhā`ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kapalua, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā`ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Library" (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā`ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Po`ipū region were also calculated. Nitrogen input to the marine environment in the Po`ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,280 pounds annually, or 14 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po`ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment:** An assessment of groundwater and surface water interaction with the marine water downstream from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.
Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB dairy neighbors and the local Kauai community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dry manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kauai, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1.670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawaii Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

Aloha to All,

We live in a condo in Poipu six months of the year and spend our other six months in Washington state. We both grew up around dairy farms and remember the cow manure jokes and flies that grow in it. There is no way that we know of that will contain the cow manure smell from spreading out into the areas around Poipu.

The farm needs to be in another area of Kauai and not the tourist destination of Poipu and the beautiful pristine area of Mahaulepu.

Larry and Karen Jerdal
HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā‘ulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila muscipula, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-‘ōhi‘a forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawaii for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhā‘ulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pats in one to three days, a shorter amount of time than the 10-30 days flies need to hatch.

In the Kōla-Pōpū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle grazing in the region on agricultural lands along Ala Kinoiki Road between Kōla and Pōpū, and it is likely the livestock-related flies identified at the HDF site occur in this area as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animal wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

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ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural
District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua'i; and (3) milk products processing by HDF. The alternative of "No Action" is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State's fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2), grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).

- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.

- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawaii Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

From: McIntyre, Laura <Laura.McIntyre@doh.hawaii.gov>
Sent: Wednesday, February 04, 2015 1:39 PM
To: HDF
Subject: FW: Runoff to Ocean

Follow Up Flag: Follow up
Flag Status: Flagged

fyi

From: Rorajohn@aol.com [mailto:Rorajohn@aol.com]
Sent: Wednesday, February 04, 2015 1:30 PM
To: McIntyre, Laura
Subject: Fwd: Runoff to Ocean

Missent 1st time

Dear Ms. McIntyre,

Please excuse my intrusion in your time. In my "go far it" review of the new pending HDF purchase of Clover Leaf Dairy on the Big Island, I read quotes by the present owner—Ed Boteilho:

"Our land runs right down to the Pacific Ocean," said Ed Boteilho the farm's operator.

"On a clear day, you can see some of the other islands. During the winter we often see whales swimming by." (a photo was submitted)

That admission ("Our land runs right down to the Pacific Ocean,") underpins the worst environmental disaster New Zealand has faced in modern history. Under the "prevent language" of 344-1, In what manner does one alert/involve DOH to this high potential? Does DOH have steam readings of the Kahalo Ditch or at the ocean as the run off leaves the Clover Leaf dairy? Who would I talk to?

Thank You for your time.

Sincerely,

Ron

Ronald John

916-330-1924
Dear Mr Overton,

I have attached the full listing of questions, comments, concerns and questions I have organized re: the EIS of Hawaii Dairy Farms concept. I will also send by mail a hard copy. The other incomplete series sent to you by section are incomplete and should be deleted. Please acknowledge by email a receipt of the attached 57 page document.

Thank You,
Ron
Ronald John
My questions begin with a concern. As Group 70 authored the HDF proposal, why would they not, as a matter befitting objectivity, discontinue quoting questionable written statements in writing as demonstrated in the text of the EIS preparation? Composition bias is evident and confirmed by their outline. The expectation of objective fact finding is lessened by their active participation. You should never rule out what you also actively participated in creating, nor place yourself in a position of validating your own veracity or competence. To be actively involved in the EIS deliberations only exacerbates this concern and creates unnecessary suspicion. Group 70 should recuse themselves from determining any factual truths considered in the EIS study. Why do they not?

I began Dec23/2013 looking at the HDF concept while reviewing Kauai as a place to retire. After my 16 Jan 2014 Guest Opinion was published in the TGI, the HDF spokesperson with others in the room with her, called me. One of her questions to me was to paraphrase: “Why was I so concerned when I didn’t even live there?” My answer was pointed. “The gist of my response was: “Not there or anywhere should such a mistake be made.” I think I referenced the Sistine Chapel as an example. I have lived and owned property in Kauai. I have family there. For many reasons it is my favorite place on earth. Careful regard should be given to such places wherever they might be.

My personal concerns/questions are multiple and have been discussed with experts in the field of agronomy, dairy, hydrology, atmospheric/weather, seismic activity, irrigation systems, statistics, and many others. A general overview and concern is the “One size fits all” mentality demonstrated in proposal areas requiring far more specificity and accuracy. The proposal as it now stands is a collective failure of due diligence. It appears more typical of an infomercial presentation attempting to promote a point of view, but void of sensible or reasonable conclusions, it is at best, conclusory allegations that have no support, void of the serious, deliberate analysis of data HDF should have submitted. It is riddled with inconsistencies both confusing and contradictory summations denied by its own data. It is a “shoot oneself in the foot” performance, with HDF’s own data conflicting more with its concept than supporting it. By what standard was the HDF proposal written? By what standard was it judged? Their method of analytics within a few pages becomes upside assertions, hardware boiler plate specs, promises and little objective support of stated/expected outcomes. Can the EIS review process give a definitive summation of “suitability” of this proposal to present necessary information and true data based conclusions?

Is need or necessity for this proposed commercial project within the scope of this EIS? If it is then a value contrast with any other use construct for this land is warranted. The underlying premise advanced with all manner of endearing phrases by HDF is that milk and thus this dairy is a necessity, a marker of a sustainability index of Hawaii’s well being. It is not. Milk is an option not a necessity. The National Institutes of Health reports that around 65 percent of the human population has difficulty digesting cow milk. The dependency on cow milk much like the human appendix is no longer a valid argument. Its need, which in my beginning years of the 1930s depression may have been warranted, has been replaced by far better nutritional options of equal cost or lower. If Ulelepo Initiative wanted to truly meet Hawaii’s basic needs, they would best served Hawaii if staying with their stated goal of solar power.

HDF EIS PN lists proposed action: Establish and operate the first grass-fed dairy in Hawaii, utilizing a sustainable, pasture based rotational grazing system. Produce fresh, locally available nutritious milk for Hawaii families.

No part of that “proposed action” is factually true. From failure to qualify as a grass fed dairy by definition of grass fed dairy to locally available, it is pure hype and contains nothing of substance. Meadow Gold owns the milk when it comes on Island in Oahu and will mix it with other state side milk sources during the pasteurization process. Sustainability can be a deceptive generalization, often a word wrapped around “an essential
needed by "or "for the long term good of the people." Often however it is a filmy cover of a "for profit" motive only,

By HDFs own indication "qualify for international sales" the intended sales target is obvious and not just for Hawaii families. Finally why would any of Meadow Gold milk be other than nutritious whether for Hawaii families or for any one else? It is a PR green washing of new proportion. Hawaii deserves more than a spin doctor, emotional appeal. Actually the real concern voiced by Kauai residents is "price of this particular product;" on that need, HDF has not yielded one penny.

The basic information needed for any purchase or lease of land required to be a primary food source for cattle is knowing the quality of the soil, its type, its water holding capacity, the water requirements of the crop being considered, and many other related soil and water essentials. Will the EIS explain their misrepresentations? Why, after "five years of study" was this basic information advanced in error when submitting the first proposal?

HDF began the permitting process by submitting their application/proposal for approval by informing the West Kauai Soil and Water Conservation District that "the soil was free draining". They were believed at face value and approved, yet that basic assertion was both misleading and untrue. After being corrected, HDF continued to base conclusions as if it remained the same "free draining soil." One would believe that an NRCS review would have at minimum, pointed out the many deficits of HDF's original proposal. Although NRCS officials made clear they did not "approve" the proposal, HDF continued to quote "approved" as support for their actions. NRCS, in my opinion, failed their advisory/investigative capacity in this particular matter. Should this deceptive beginning be an EIS concern?

A clear indication of HDF awareness and the certainty of the farm flooding is given on pp. 73 last submitted proposal (Quote) "The dominant soils on the lower farm are Ka'ena Clay, Kala patrol Clay and Kahili clay (actually there are Ka'ena Clay and Kahili clay type soil extending much farther through the farm in all directions-writer notation) which are prone to compaction and all are characterized by poor draining. However less than two days after heavy rain, with rapid removal of the surface water during and after a significant rain event, they are observed as being dry enough to graze even without a Kikuyu thatch." Just that admission should close the door on this site selection. It is self-confronting and damming. Keep in mind there are 352 Acres of Ka'ena Clay and Kahili Clay poorly draining type soil and that type soil extends much farther into this farm site and in all directions. Will the EIS review evaluate the meaning and end result of applying this data?

"Poor draining-"rapid removal of surface water" To where? With that admission, what other indication is needed to verify that draining manure laced soil to the streams is going to happen? If there is another definition to zero discharge what is it? If there is truth in the statement regarding soil type quoted above, on what basis would this farm site qualify as "suitable soils"? (see Group 70 EIS Preparation Notice pp.2-1) The words "promote efforts which will prevent and eliminate damage to the environment and biosphere—(Chapter 344-1) are clear. What reasons, methods, or new knowledge will in reality support that the dairy project can do other than create serious damage? "Prevent" not wait until?

The land total of the soils listed on pp3-1 of the HDF EIS Preparation Notice as Kalihi and Ka'ena soils is 352 acres. These soils have a Ksat level from 0.00 (no capacity intake) to 0.20 (1 fifth of an inch per hour) (pp 12 HDF proposal) A University of Nebraska dairy expert (name given by request) indicated that those soils can run off almost instantaneously," yet on pp 42 is the explanation that a 0.39 inch of water (as the pivot is rotating) is put down on the 352 acres of that soil type. The spray is by applicators dropping that amount as they continuously move- not a same spot application over longer time duration as does rainfall. Will the EIS evaluate how it is possible that such application; approximately twice higher than the highest absorbent capacity of the soil, and on top of manure already deposited on the field, does not create a run off of a mixture of water and manure to on field drainage systems and on to the ocean? Drainage systems are not holding ponds. (see code 633 Waste Utilization page 2 of 3) "When liquid wastes are applied the application rate shall not exceed the infiltration rate of the soil and the amount of waste applied shall not exceed the moisture holding capacity of the soil profile at time of application. This is basic to every rate of application of liquid waste or water. Will the EIS review tell us what in the proposal, other than promises, display that this basic is
understood. How was the limiting factor - holding capacity of the soil in the area recognized? What is unclear to HDF about this regulation? The ignoring of this understanding is replete throughout the entire proposal. Other than an overriding intention, what other reason can explain the ignoring of such clear, necessary, appropriate agricultural regulation? It is a basic agriculture standard.

Page 40 HDF proposal indicates a pivot rotation schedule of 40 hours each pivot. Poipu (next to the dairy) has a 16.2 mile an hour average year round wind with gusts to 40-50 miles or higher an hour. Farther north toward the mountains it is higher. Sophisticated VR1 irrigation systems can interpret weather conditions, but sudden, random gusts of higher winds first have to occur before shut down is activated. All interactions have a time interval. Multiple ditches and streams traverse the areas and run off to the beach. Under these conditions, can an overspray wind drift transfer to the water ways occur? Why not?

Irrigation experts point out that VR1 equipment with so many more interactive components are prone to problems, and that the spray residue left on the pivot equipment may drop off when moving across ditches and streams. Is there a possibility that this contamination/pollution of the waterways will occur?

80 hours is required to irrigate not counting the time required for effluent spraying. Given the average yearly 16.2 wind factor, and the nutrient requirements determining the pivot use schedule, if held to a standard of no overspray wind drift can HDF demonstrate how their irrigation scheduling requirements can be reasonably meet? Does the failure of proper effluent and irrigation application scheduling effect all other nutrient variables?

On pp 39 of the HDF proposal is Table 12- is a listing of required irrigation days per month. No one should use averages in this type calculation nor apply any application on the basis of average. If the nutrient needs are spoken of as averages that too is wrong. HDF does however, indicate "significant rainfall in these months is probable and could cause the soil to exceed capacity from rainfall alone" (pp39). HDF does not show precise area soil Ksat data. The Ksat data is given as a range. Its capacity to take in moisture could be 0.00 (none) and not the highest rate of 0.20. How then can the same rapid rate pivot irrigation concept of 0.24 have any merit in reality? Isn't runoff or flooding the outcome of "exceeds capacity of rainfall alone?"

Given the information of the last question and the conceding of a 10.4 rain event by HDF, where would the millions of gallon (27,154 gallon per acre per inch of rain per hour) run off from to the other 576 acres (not counting that in the effluent ponds) when the manure covered fields receive this same rainfall amount? A 10.4 inch rain event on saturated soil will send 162,000,000 (162 million gallon) of manure laden rainfall on a downhill course 0.7 miles to the ocean. That event was described by a rancher as "water higher than the 4 foot fence posts."

A 24 hour 100 year review of storm participation was offered as proof of compliance by an HDF spokesperson 23 January 2015 (Quote Amy Hennessey Jan21/15 TGI) "Our farm's effluent ponds are designed beyond the requires size to accommodate a 24 hour 100 year rain event." HDF uses the figure of 10.4 inches in a 24 hour time frame. That data is not remotely true.

National Oceanic and Atmospheric Administration data from 1950 till 2000 (50 years) will point out how much defining data was ignored or left out by HDF. Specific to Kauai: there was Hurricane Iniki in 1990 with 52 inches falling in 4 days. Nina in 1957 with 20 inches of rainfall in 14 hours, Dot in 1959, with the eye directly over Kauai, Iwa in 1992 and all gauges down listed as Heavy rain, Iniki in 1992 all gauges down listed as Heavy rain. If anything was left standing including dairy cows, these Hurricanes would have filled the ponds and quickly brought them to an overflowing runoff stage.

Quote; "It is commonly believed from recent history that Kauai lays in a more vulnerable position than the other islands. However, in his recent analysis of Hawaiian hurricanes, Dr. Tom Schroeder of the University of Hawaii, Meteorology Department, concludes that every island has been affected by hurricanes and that no island is without risk." (NOAA report)

The unpredictable direction of hurricanes and tropical storms is a meteorologist's nightmare. Indicated in a 2002 NOAA document Atlas of Natural Hazards in the Hawaiian Coastal Zone is data showing that in just 43 years- (not 100 years) between 1950 and 1993 there were 25 hurricanes that hit the islands, and an additional 33 Tropical Storms rain events
occurred statewide. In areas of known seismic activity, construction building standards, integrating that factor, are mandatory. So too are DOH standards for properly sized effluent ponds. Given “no island is not without risk” what support if any, can HDF give for not constructing effluent ponds based on actual rainfall data? What are the new dimensions of the ponds and the capacity? Were they designed on a 2000 dairy cow basis. Page 47 indicates “The pond is oversized to allow for Phase two effluent volume requirements yet it only displays “Phase one Minimum Volume gallons. Roughly speaking 2000 cows will fill the pond 3 time quicker than 700 cows. On page 53 one reads (quote) “even twice this amount at 0.25 in won’t be excessive if the soil moisture levels allow” That statement leads one to believe that HDF hasn’t yet considered the row known and dominant major soil type (poorly draining) and ksat indication (0.00 to 0.20 in) that they are truly working with? Will the EIS review this area?

On 15 February 2015 Kayle Datta (senior partner Uleponi Initiative) in a TGI Opinion wrote “To be clear, there has been no storm event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Mahaualepu Valley” Three main concerns regarding this assertion need answering by the EIS review. One is the certainty that only at one time will the effluent ponds be totally empty. The milking parlor is in continuous use facility. The wash down and manure from the dairy cow, calving pens etc. are flowing to the ponds on a 24 hour a day cycle. What is the square footage of all areas that run to the effluent holding ponds? What is the total amount of water, manure and urine, general cleaning procedures, including wash down of each dairy cow and waste from the calving sheds etc. that will run into the effluent ponds per day? On page 26 and 43 are listings of “gpd” (gallons per day) usage of water. On page 43 we see an indication of “2840 gpd Machine wash.” In reviewing “gpd” it is difficult to find any wash down system that uses less the 6.8 gpd per dairy cow. HDF will wash down the dairy cow 2 times each day with a total of 3.7 gallon per day. If more than that amount is required a 2000 cow wash down would place a significant higher

amount of waste water in the ponds. Will the EIS be specific enough to analyze these possible variations? What are the new sizes of the ponds? Are they sized for 2000 dairy cows? If the total sq. ft area is larger than 16000 sq. ft (approx. 1 third acre) can one assume that a 1 inch rain event would by itself add approx. 9000 gallon to the ponds? If that is correct how much more is added by the 1 inch rainfall runoff from all other milk parlor areas that run off to the ponds? The second concern is the narrow weather bandwidth of “rainfall in Mahaualepu valley” as a determinant of pond size. That data needs EIS review not just of an individual rain gauge, often not working, but rainfall from a much wider area (Lihue Airport for example). NOAA weather records etc.) Third- it is not the effluent ponds that will do the most damage. It is the total rainfall amount of sustained storm events over successive days and which are significantly beyond Ksat intake ability that determines the outcome of these interrelationships. Wouldn’t rainfall numbers charted against Ksat capacity numbers reveal whether/when runoff will begin? It becomes a pollution runoff certainty when a rain event occurs and the high AU ratio to acre pod grazing method (300 to a pod) has left such a high amount of manure to be washed away from fully saturated soil. By the stocking rate(300 dairy cows per pod) the 3.2 to 4.2 acres pods become uncontaminated zones for the mixing of manure and rainwater. 2,000 cows grazing on approximately 24 per day (83 cows per acre), will result in at least 200,000 lbs. of manure and 16,000 gallons of urine left daily on the clay soils found on the farm site. On a “poorly draining” soil pod with a multi-day series of rainfall or a one day rainfall above 0.20 inch per hour, that combination of factors will result in runoff. Residents familiar with the area tells of “rapid rate rainfall that “started brown water run off all most immediately from its beginning.” Protective barriers/berms are mandated to protect from fecal runoff from roadway, raceways, runways and walkways. What protects the steams from the runoff from pods? What other explanations/outcomes are there? When used as a cane field it, as a matter of course, drained to the ocean. As the pods would now be covered in a high volume of manure that result is not allowed to happen. There are 26 single days in the last 25 years which
exceed the amount of rain that created significant flooding from run off of the HDF proposed dairy farm area. That 2 day amount of Feb 16 and 17th 2014 was 320 inches and flooding was noted. **Will the EIS confirm/answer these concerns?**

Conspicuous by its presences, and also by its disregard by HDF planning, is a Taro Farm in the lower left hand quadrant of the property. That private property requires flood irrigation, yet abuts a sludge containment area containing 2 acres and block F of 54 acres, which is described on pp73 "are perceived as heavy, flood frequently and difficult to crop. No indication of protection or concern for the Taro Farm is written and runoff, over spray or intermingling of its water with effluent mixed water is not considered. Why not? What should be done to protect the Taro farm from this intrusion? By the same token what keeps the tao farm from spilling into the HDF farm site, mixing with the 82 acre M and S area and then draining directly to the ocean?

Many states have Odor minimization plans Counties, townships etc. are growing rapidly in number as they put restriction on this form of pollution. The recognition of the profound effect foul odor can have on the physical health of residents, and the debilitating outcome it will create on the economic climate of the community is becoming more based in scientific certainty. In Kauai 1000 jobs at minimum are on the line the first time a foul odor drifts to 1.7 miles from the dairy farm to the front door of the Hyatt and other nearby resorts. That downside information will travel around the tourist industry truly at the speed of light. Residential property values will significantly decrease as well as a significant tax income deficit will hit Kauai. **The health issues are numerous and a plan must demonstrate consideration for those about them.** An EIS review should reveal if there was any evidence within the HDF proposal of this consideration. That review should assure and describe in detail on what basis these outcome will not occur. A row of Norfolk Island pine won't do it. The assurance given by HDF i.e. the cow will fart less, and nutrient supplements will make it smell less doesn't cut it so to speak.

My daughter and her family now live in Kauai. They, as I know, what Chino CA and now Tulare Co. in CA, smell like. England on a cross wind day can smell France's farm area. A farm odor of the nature of that which will be created is not compatible with the existing environment. Anaerobic digesters (which they did not select) can cut the odor down. Digester would help to minimize greenhouse gases, but nothing can stop it entirely. Even if digesters were used for the manure washing to the effluent ponds, there still remains the high tonnage of manure dropped on the paddocks each day. That element will ripen in the sun or rain and the wind speed and direction, ambient air temperature, stability class, mixing height, and precipitation and pressure, will decide "that odor is headed downtown Koloa and Poipu. HDF's manager was a CAFO manager in Vado New Mexico in 2006. That "Dairy Alley" between Las Cruces and El Paso is known and written about by a national newspaper and featured by NPR. It is infamous for its pollution and smell and well the HDF manager is aware of it. The sludge dumpage on 82 acres is environmentally intrusive and unnecessary. It demonstrates corporately insensitivity to others around them. This placement of the sludge area closest to others (1.5 to 1-7 miles) outside the lower Mahaulepu Road fence is truly an "in your face" nose thumbing at Poipu. Koloa and the Lawai valley.

A odor minimization plan appears as an HDF postscript. HDF has treated that critical area with one line "All material will be handled in a manner to minimize the generation of particulate matter, odors and greenhouse gases." (HDF pp.85 first proposal) The same lonesome line is on page 75 of the 3rd proposal. It is not mentioned in the redacted proposal. That's it? Just the word or suggestion of odor mentioned once in a 100 page industrial sized dairy proposal? An apparent fill in the blanks or after thought? "Odor Minimization" no big deal-not even a mention in the proposal table of contents? When first approaching a dairy you might first spot the silos. No later than 2nd you smell the dairy. In "Understanding Concentrated Animal Feeding Operations and their Impact on Communities" (Hirbar and Schultz National Association of Local Boards of Health 2010) one finds a more serious understanding and summation. (Quote) "One of the most common complaints associated with CAFOs are the odors.
produced. The odors that CAFOs emit are a complex mixture of ammonia, hydrogen sulfide, and carbon dioxide, as well as volatile and semi-volatile organic compounds (Heederik et al., 2007). These odors are worse than smells formerly associated with smaller livestock farms. The anaerobic reaction that occurs when manure is stored in pits or lagoons for long amounts of time is the primary cause of the smells. Odors from waste are carried away from farm areas on dust and other air particles. Depending on factors like weather conditions and farming techniques, CAFO odors can be smelled from as much as 5 or 6 miles away, although 3 miles is a more common distance. (Understanding Concentrated Animal Feeding Operations, State Environmental Resource Center, 2004)

To the writer the obvious absence of concern for this area is telling, shaming, and inexplicable. It flawed the due diligence aspect of proposal preparation. It is a glaring disregard of basics and its lack requires explanation in the EIS review. Why or how can this factor be seen as insignificant by anyone of any level of agricultural knowledge? What tangible data support can HDF give that demonstrates no odor drift? What odor carry distance data have HDF developed beyond the HDF spokesman - while in New Zealand - not being unable to smell the effluent beyond 20 feet? What is the spectrum of health risks and environmental degradation? How are those elements clearly mitigated? What is the plan? As a small example why, if only for Koloa and Poipu's well being, is the sludge area located on lower Mahaulepu Road, nearest (approximately 1.5 to 1.7 miles) to Koloa and Poipu and not located to the rear by the effluent ponds?

All of the land where the Hyatt and other resorts are located were once zoned for agriculture use. "How can this proposed dairy project location be considered compatible or justified. What is meant by "compatible usage"? Sec 8 1.5, Kauai County Code, 1987, as amended defines compatible usage as follows: "Compatible Use" means use that, because of its manner of operation and characteristics, is or would be in harmony with uses on abutting properties in the same zoning district. In judging compatibility the following shall be considered: intensity of occupancy as measured by dwelling units per acre, pedestrian or vehicular traffic generated, volume of goods handled, and other factors such as, but not limited to: vibration, noise level, smoke, odor or dust produced or light or radiation emitted. (Sec. 8-1.5, Kauai County Code, 1987, as amended) What is meant by "and other factors such as but not limited to" in the above cited Kauai County code? What does "odor" mean as mentioned in that Kauai County code? When a project at best puts up as collateral a promise that is may result in 15 jobs and a product shipped off island to be mixed with stateside milk and also clearly states it won't be lower priced; what indices justifies the risk of harm to benefit ratio?
HDF EIS PN Kauai - Ronald John

2nd Series of comments, questions and concerns

The inability of most of the soil to percolate, the limited capacity of the ponds to hold an actual measure of what rainfall could bring, and the sustained and periodic rain events which last for days or weeks, (much as the 40 plus inches Easter flood of 2008) will create an uncontrolled release of polluted matter. In February HDF was sent pictures of the "Easter" flood damage. Seeing the clear, evident flood damage and knowing that other rain events have been left out of HDF considerations; for example In Dec 15 to 16 2008 a totaled of 11.11 inches fell at Mahaulepu, why and for what reason is such information not been given due consideration by HDF? What specific reasons or improvements can HDF indicate that would explain why no pollution will leave the property? It isn't just about an effluent from the effluent ponds. Every rancher that has used this property has seen the entire area flooding and often. Just last year the road below it was flooded. It is not an uncommon occurrence.

Amy Hennessey spokesperson of HDF wrote. "Water quality management is an important part of the plans for the dairy. We will be implementing a water quality-monitoring plan to help the farm be protective of the environment." A water quality monitoring plan tells you what is or has happened. With rapid run off release that time is often too late.

What HDF doesn't seem to understand is the difference in what they say they will do, and how HDF does not have a "how to do it" plan to handle pollution run off nor how to prevent it. They speak of it as a given or an accident. Why. Monitoring stations will tell you of it, but who needs a device to tell you its flooding? Then what? Call it an accident? (Certainties are not accidents) Move the cows? The dairy cows are either trying to stand up on slick water covered, non-absorbent clay soil or perhaps learning how to swim. This area must be covered in the EIS evaluation process.

HDF has presented a concept that preceding a rain event, overflow possibility they will empty the effluent ponds out on the fields (see page 54 HDF Quote) "If warranted due to potential impact from an approaching storm event the settling pond could also be pumped empty with in an additional 40 hours") This is an intentional transfer of waste when under threat of a weather event. EPA does not approve/condone that action (see Sec 833 Page 2 of 3 under Additional Criteria to protect water Quality). "Agricultural waste shall not be land applied on soils that are frequently flooded, as defined by National Cooperative Soil Survey during the period when flooding is expected." The manure covered fields would already be facing an overflowing of a mixture of manure and rain and such an additional dumping of effluent will add to that overflow...

The basic expectation is zero discharge. The first gust of wind on a windy evening at Mahaulepu, and the tall irrigation pivots and gun arrangement will leave pollution in the water ways of Mahaulepu. According to HDF there are 14 ditches traversing the property. No reputable irrigation expert or VRI representative will tell you that these devices are free of a level of spray scatter, mist or wind drift when operating, nor will they tell you that the system is a 100 percent error free. It is generally recommended that spray application of wastewaster should be done under low wind (less than 5 mph) conditions and after mid-morning, preferably in bright sunshine. What VRI error rates were known by HDF? Given the 16.2 average
wind speed at Poipu, in what manner can HDF spray effluent when needed, and make any assurance that polluted effluent doesn’t reach the streams? What regulations have HDF adopted re: spray application and wind force?

Quots HDF spokesperson: “Most of our animals live, long, happy and milky lives.”—Compared to the human species, the dairy cow is the princess and prima donna of the bovine world. She is far more sensitive and fragile than her cousin the range cow. To some she is a liquid white gold machine; an ATM so to speak. Unlike wild animals, the dairy cow cannot leave her pasture to seek protection under harsh conditions. You need to provide it for her. She will not want to be inside all of the time. However, she will need a shelter option when the weather gets nasty for prolong periods of time, need to escape fly swarms, or simply to rest.

Few animals are comfortable when eating or laying in close proximity of fresh feces. This condition would be especially true if the dairy environment is configured as HDF has designed it. When the tightly grouped mob of 100 to 300 dairy cows on one small 3-4 acre pod begins to download tons of fresh manure at the same time, and in the same area where they are grazing, when they have been exposed to a rain event for consecutive days and standing in mud till foot rot begins, when it is unseasonably hot for days, the irrigated effluent is ripe and flies are on them from all angles what then is the remedy? Why is HDF not building a shelter for the dairy cows? If for no other reason, income studies point out the significant added income when you have a “satisfied” dairy cow.

Other groups including some civilized countries see this as humane. Be it your heart or your wallet she needs shelter. Why is HDF ignoring this need? What shelter of any sort will be provided?? When more serious storm events occur where do the cows go when flooding occurs?

HDF has not shown an active concern for a shelterbelt location.

Why not, and if they have one, how workable is it?

On Page 73 8.4.3, the Mahaulepu soils, particularly in the south central portion of the farm (Block F, figure 23) are perceived as “heavy, flood frequently, and difficult to crop.” There are like soils with the same Ksat rating. A statement that “they are “observed” as bring dry enough to graze even without a Kikuyu thatch” is below and begs any acceptable standard of verification. “Seems good -looks good” doesn’t cut it so to speak. This is a critical factor. Where is the data?

What does it say?

Why did HDF state “the dominant soil types on the “lower farm” when actually these soils extend from lower Mahaulepu Rd 2/3rd or more, through the middle of the entire property, and poorly draining soil is the dominate soil type not just of the “lower farm” but of 352 acres of the property being used for grazing purposes? How does HDF reconcile the separate and different irrigation concept for Block F and not the other 300 acres composed of the same soil type (poorly draining)? Shouldn’t the soil type define the irrigation method? These soils are group D soils (see: Department of Agriculture Natural Resources Conservation Service Part 630 Hydrology National Engineering Handbook Soils in this group have high runoff potential. ) Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a clay pan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission."

With soil type differences, different irrigation methods and nutrient limitations, has HDF successfully irrigated the kikuyu, and does proof of such successful trials exist? What is that proof? What trial data, date, and field location demonstrates the 18 day recovery
rate claimed and used to support the rotation of paddock at an 18 day level? What trial data of tests ran on different soil types at Mahaulepu supports that conclusion? Does the kikuyu yield, if any, match their indicated nutrient needs? How many acres of Kikuyu have demonstrated/met a 20 ton “kikuyu yield goal?” (page 57) What is the nutrient differences in Kikuyu and a mixture if Kikuyu-Guinea grass (pags2-2 HDF Els PN)

On page 73 a mention of “drainage system” is noted. Keep in mind that any drainage/runoff of a grazing area is an area covered by recently fresh manure and or effluent, the lower farm area is generally at 61 feet elevation, the effluent ponds are at an elevation significantly higher, the adjoining streams and drainage ditches run to the ocean. With full understanding of what “zero discharge means” how does HDF explain why stream water pollution won’t occur?

Kauai needs development that adds economic security and stability. This HDF type intrusion on the south shore of the “Garden Island” is without precedent. The negative economic impacts possibilities stand out clearly in the light of studies from other CAFO areas. Never before in the world has any one attempted to locate a CAFO close to an upscale residential, hospitality oriented, internationally known, ecological, archeological significant, and spiritual environment; one so highly rated that national park status is pending.

CAFC’s can devastate the environment and human health. The presence of a facility like a CAFO reduces overall tax revenues. Assessed evaluations of land and houses nearest this industrial dairy will consistently decreased by 20 to sixty percent in recognition of the loss of value that accompanies the odors, flies and other forms of pollution from the CAFO. Studies show that (Quote)” resulting losses in property rates are impossible to be made up from the new taxes generated by the CAFO for two reasons: first, a CAFO is specifically structured to minimize the amount of local taxes it pays and second, a CAFO is capable of polluting a substantial area around its perimeter and this area is likely to have an assessed value that far exceeds that of the CAFO.”

The Hyatt employs a thousand people. This particular CAFO, by its own admission, offers 10 to 15 jobs, which HDF indicates in their proposal, may not likely be filled by locals. That point is reinforced by reviewing HDF hiring practices so far. The present HDF Manager is a former CAFO manager from Vado New Mexico, a dairy area noted as one of the most polluted in the state and one written about nationally. So far work has been mainly by New Zealand crews under the direction of an onsite general contractor from the east coast of the USA. If the measure of this concept is jobs created and dollars left on island to circulate among other vendors on the island, then what HDF brings economically to Kauai, can be replaced by a local, quarter acre sized, locally staffed "Dairy Queen Drive In” with no downside. Has that potential downside of this experimental dairy been examined? Under the principle “First do no harm” what are the factual assurance of “no harm”?

Public Nuisance laws are being tested by this HDF dairy intrusion. The law regarding public nuisance is more and more focusing on industrial dairy intrusions. As their pollution affects are quantified there is a widening in definition. Legal interpretations often see this type of incursion as
unlawful, "an unreasonable interference with a right common to the general public, or an activity considered unreasonable as the gravity of the harm to the public right outweighs the utility (benefit) of the activity. What case law is used by HDF to support their dairy incursion on already existing neighbors?

HDF continues to reference water conduits other than the effluent ponds. On page 5 of their last know proposal, they speak of "water wells, reservoirs, irrigation ditches, drainage ways and culverts" On page 49 they speak of "existing drainage way." As previously noted, on page 73 is a mention of "drainage system." In addition 2 fixed cement water troughs per paddock would make 238 fixed water receptacles; all inside the effluent spray zones and within over spray/mist distance. It is understood why effluent ponds are required especially for close containment CAFOs, but in this new model, all the property not occupied with or by the milk parlor (570 plus acres) a receptacle (a tilted to the South East, giant saucer if you will) for a manure and urine loading not consider nor regulated in Hawaii before. The Maximum load of cattle grazed at the HDF farm site from 1995 till now has seen approximately. 300 range cattle, yet the streams running through the farm site and on to the ocean are polluted to an extreme with that load of cattle. (see Surfrider and DOH data). What created this pollution? Could it have been from the cattle being pastured there?

One fact must be emphasized. 1 inch of rain per hour drops 27,154 gallon of rain on each acre. One local rancher indicated that "heavy rains in that area have started run off almost immediately". Obviously then in this poorly draining soil- a "rapid rate of rain" fall will also create flooding conditions. HDF clearly confirms the ranchers statement of rapid rate of rain fall runoff (see page 73 Quote). "With rapid removal of the "surface" water during and after a significant rain event''. "rapid removal" of "surface water" "during"-- What other assumptions/interpretations can be made from their open admission? A serious rain event could cause a certain overflow of the effluent ponds, but an unmitigated disaster would be occurring as 8 million gallon of manure laden water per inch of rain per hour, from the rest of the 574 acres remaining, will begin a down slope runoff to the ocean just 7 tenths of a mile away. No longer, as in cane or taro production, is it supposedly just a run off of muddy water. With 3 inches of rainfall on just the 352 acres of poorly draining clay soil you would have 28 million gallon of mixed manure and rain flowing off property. That figure is 17 million gallon more than the Exxon Valdez oil spill. (11 million gallon) spilling on a world renown reef and covering a 10,000 year old "Cave full of artifacts and threatened species" that simply can't be replaced at any price...When using the 10.4 rainfall figure given by HDF and applied to 574 acre shallow dish catch basin as the farm property can be described. That full run off figure becomes a 168 million gallon run off from property. One rancher indicated that "water ran over the top of the farms four feet high fence posts. The EIS should consider the "prevent" wording of 344 State Environmental Policy. This data alone should factually support that this site is wrong and that the dairy belongs on a more suitable site. What information/data if any invalidates this high and statistically certain risk and of which HDF data confirms?

I do not particularly "love" the dairy cow as the HDF spokesperson has indicated. HDF does (Quote Amy Hennessey "We love animals"-Jan
29/24 TGI; but I do understand her (the dairy cow). Range cattle seem to move quicker than Dairy cows but the pace for both is slow. I have trailed cattle. I cannot conceive of a HDF workable concept that explains how to get a 300 cow mob up a raceway to the dairy parlor yard while 300 more need to leave that area and go back to the same pod they came from. I do not believe that the HDF paper concept will work under real life and varied conditions. At no time can you effectively have coming and going, intermingling mobs, cattle traffic. Such a stock traffic pattern would require clear fixed separation. It they must get one mob back to its pod before the next mob starts then the predicted time schedules are not close to real. If they use quadrant separation of the six daily required paddocks then the pivot irrigation concept is complicated at best...The outside perimeter distance of the paddock to the milking parlors appear to range between 200 yards on its west side just beyond the calving sheds to over one mile and a half south to Mahaullepu Road. It is, a mile to the northern tip and east edge of the farm. If a dairy cow is more than 900 yards from the dairy it will not work as indicated. Studies indicate the dairy cow pace at average is 1000 yards per hour. At this time there are range cows near the HDF property... Borrow one from the Mahaullepu road area and trail it up to the milk parlor area at normal pace. Keep in mind the dairy cow would be carrying an average of 110 pounds of full udder weight also, wait for reasonable intervals (as long as it would take to get her washed down, milked, fed and back to the original paddock). How did it go, or better where did the time go? The stated maximum build out of 2000 cows will result in 4000 milkings, 12 rotations, every 24 hours without interruption. **If one waits as described to get the dairy cow up and back before the next mob begin this rotation, how are the 12 mob rotations (to milk parlor and back) accomplished even under normal conditions? What data supports such practice?**

The need for continual 24 hour full operation leads to the next concern. Very few dairies exist that brings so much varied power demands at such a constant high draw level. From electric fences to refrigeration, from automatic milking machines to roads, ramps, raceways lighting, paddock fencing, system pumps, such as those for the effluent ponds, and paddock watering trough systems; what happens when power is lost as it was 2 weeks ago (mid Jan 2015)? No separate backup power is mentioned in the HDF proposal nor could a backup generation system of normal size power up enough to handle the full electricity demand of this dairy concept. In a major storm event-- power out over days-- what will be done to maintain the viability of a sensible dairy operation? Do plans exist showing an off line from main provider secondary power source? What is it? How does it work? If the solar paneled roof concept is conceived as adequate to meet an offline from main source line need, then that data must be demonstrated re: a full and complete storage/ usage/ demand comparison. That comparison must be projected over the usual common outages occurring in that area and for outage times reflecting major event disruptions. What data exists re: Photovoltaic solar Modules (solar panels): and high wind created loss of these panels by wind force? What is the possible wind load of that area of the farm?
3rd Series HDF EIS PN Kauai Ronald John

Comments concerns and Questions-Kauai

What follows is additional information re: the HDF partial review and claim of a 100 year review by their Spokesperson and used to support the size of the effluent ponds. It is an Example of content in a 2002 NOAA document: "1950 Kauai: 52 in rain over 4 days, flooding. 1957 11/30- Nina NNW, passed Kauai 928 21 35 Kauai: 20 in rain in 14 hrs, 12 homes damaged by $1,056,000 --------(Chart 5)" (Atlas of Natural Hazards in the Hawaiian Coastal Zone


It is information too important to be ignored, left unfound or not used. It changes the parameters that safety and well-being requires. Why has HDF failed to acknowledge in full all the weather events that would at minimum, significantly disrupt dairy production? Given the variability of weather patterns shouldn’t all the full island weather conditions be taken into consideration. If not why not?

If one analyzes just the Mahaulepu rain gauge data he will find 11 rain events that were 6 inches or more occurring in the last 25 years. If he reviews successive day rain events he will find 6 that were over 8 inches and which happened in the last 14 years. If evaluated by approved objective evaluation standards, you would find that in at least one of these 17 rain events (when applying only three known facts—soil type "poorly draining", 352 acre total, and Ksat level (0.00 0.10 or 0.20) Lowest average, or highest Ksat level shown—you will still have one result—flooding beyond the HDF property.

What evidence contradicts those findings?

On page 27 of the HDF proposal is a description of the 236 watering troughs HDF will use; "high enough for the animal to reach over and in but will discourage the animal from stepping in." A cow, at times, seems to become confused as to knowing which end they drink with. This has been observed as a good reason to not drink downstream from the herd. Can this misinterpretation of which end should be next to the water trough happen in regards to the HDF water troughs?

Indicated is "refill the trough as the water is consumed." What happens to the water in the trough when the paddock is emptied and the water trough is full? "Does it then automatically drain (explain this mechanism) or sit full, partially full etc. and stagnate for the next 18 day rotation cycle? Can it be filled or emptied manually if the main power is lost or if some form of pollution is noticed in the trough?

Even the best water troughs accumulates dust and other particles. Over multiple hot days it’s not unusual to see a buildup of undesired elements. Who cleans the trough? How and how often?

What set back footage figure from the troughs will be used to determined that overhead spray of effluent does not fall or be blown into the troughs? It is presumed the wheel tracks for the pivot system are set and not close to or encumbered by the fixed in place troughs? Are they?

On page 4-1 of the HDF EIS PN is the statement "identifies the region as important agriculture land for Kauai." It would appear that such terminology mainly represents the ability of the land to be used in flood irrigation type context i.e. a Cane or Taro field for example, or that the soil type was not considered in determining such land designation. Grove Farms allowed a massive dumping of Class B solids by Aqua Engineers on land in close proximity to the HDF site. That is hardly an indication of "important agriculture land" consideration, and the meaning of such designation is flawed by the obvious granting of such use. Why is this term seen by Group 70 as supporting this particular agricultural project and not more likely a PR attempt by themselves to favorably (not unbiased) represent HDF in this EIS endeavor? (Quote) "with high quality soil agricultural productivity ratings." Putting generalities to the side, what are the specific rating of this specific soil in this same area. Perhaps Group 70 should recognize the meaning of the term "null hypothesis" and take the Aqua Engineer allowed use of the same land area as dumping ground for Class B bio solids near the proposed farm with that of HDF allowed use?

The HDF banner word is "sustainability." It is a buzz word; difficult to put fact based parameters around. What in this situation does it mean? Is there any indication that HDF is going to lower price on their milk?
Will HDF lower the price on the milk produced at Clover Leaf dairy presently being purchased by them as Mr. Whitseide has just done to his Big island dairy prices? Price of product is the problem and not sustainability. No situation can actually occur in the islands that cuts milk availability/sustainability which wouldn't also cut all other resources including power loss. What alternate uses for this particular site were examined i.e. local food crop production for direct local use? With that use of Mahaulupu, it would be a true marker of one of many varied sustainability definitions.

Under the summary of page 2 in the HDF EIS PN is a reference "establish the herd of dairy cow over several years". The initial 700 dairy cows arrive inseminate through a method of sex determined means, which generally produces more heifers than male calves. In addition to the first 700, and within a few short months, there will be 700 calves mostly heifers; likely 400 heifers plus in number. The new heifer in order to produce milk has to lactate and she will, along with the initial 700 dairy cows, calf within 2 years. This geometric progression is hardly "several years" but will be far beyond a 2000 head count in less than 4 and a half years. What is gained with the "veiling of intent" "over several years" language? It isn't a matter of depending on other conditions. It is what it is by nature of dairy cow breeding practice. Along with a maximum 2000 dairy cow operation come 2000 calves. Other than the mention of "calf sheds" nothing regarding the bull calf disposal is mentioned but questions do arise. "Calves are moved into open paddocks after 3-4 weeks" Does HDF mean just heifers? Where do the male calves go? What contracts/permits exist between HDF and local ranchers for dispensing the male calves among them? Will they be slaughtered when born? For what reason and for how long are the heifers in the paddocks? Will they be contracted out and off site for repurchase later? This spin off second industry adds much more than just another grazing/feeding concept. It requires far more than a one line statement. Explain all the factors, paddock space requirement, manure increase etc. That will be created if the heifer count is added to the mix of dairy cows being milked and dry cows totals. Have they been counted in the HDF total or is the HDF numbers given only for milk producing cows? At any one time after full 2000 build out, what is the general representative number of each category i.e. milking cows, cows that have recently given birth, cows with special needs, dry cows, close-up heifers, replacement calves and heifers? What number of calves does HDF accommodate with the calf sheds as described on page 23 (new proposal)?

On page 30, a reference is made to drip tubing or tape. What irrigation expert or firm, and why would they indicated the use of drip tubing or tape as a method for an area where a 330 dairy cow "mob" will mass be placed to graze for 22 hours on pod sizes from 3.04 acres to 4.03 acres? On a normal rain, with that load, damage or hoof penetration is likely. Was the fact that the dairy cow is walking in wet soils considered when selecting this unusual irrigation concept; one more sensible for row crops than a cattle grazing area? What dairy irrigation concept supports this method of irrigation under these actual conditions?

On page 54 3rd proposal- one reads "gun type application system to area outside the liquid effluent application" Those areas are on the fringe areas of the property. On page 54 Redacted and 3rd proposal HDF reference: the gun and their 65 foot radius of spray area will be moved around the paddocks. The first application method is a mounted end gun on the pivots, and the second gun system is hydrant mounted guns used in the paddocks. Some paddocks; almost the closest property to Mahaulupu Rd will be covered by the first method. Use of the 2nd system gun system in other paddocks sets aside the assurances and claimed precision of the VRI system of irrigation. It is a wrong and primitive solution. It literally cuts corners and should not be allowed. It is a rare reader that has not been hit by wind-blown sprinkler spray or mist from a gun type application. Water ways are in its path (See page 32 (canal/ditch) running through the lower right corner of the property. A gun type irrigation system spraying effluent will with wind drift create a combination of pollution either by odor, mist or both. It is a high error primitive system never used when sensitive areas must be protected. Its error rate is high and effluent scatter is at the whim of the wind. With sensitive streams areas near there should be no error variable in play. See as follows: and substitute the word "effluent" in place of "chemical" Western Agri Res Center PO BOX 1342 BLACKFOOT, ID 83221 Performing Department
(N/A) Non Technical Summary
Application of chemicals with irrigation water is a widely adopted practice
with center pivot irrigation systems, however, the standard practice of
calibration at a constant rate results in systematic chemical
application errors ranging from 7 to 22% for center pivots equipped with a
corner watering attachment and/or an end gun. Is this a important
certainty to consider? Does the application error mean amount of
chemical (effluent) being distributed or include errors in pattern
distortion? All solid research on sprinkler efficiency mentions
"minimum of pattern distortion" What does that mean? What about"minimum" reflects zero distortion? Does it refer to distance as a
variable not a fixed precise measurement? What error variance was
considered by HDF?

It appears that the only set number given for off set allowance of a gun
irrigation system use is refers to on page 96 2nd to last paragraph. That
paragraph refers to "damage to structure" i.e. "spread the effluent no closer
than 50' feet from open water sources when applying liquid effluent with an
effluent gun travel. That system is defined as." The big gun" sprays a
huge stream of water high in the air during irrigation, which is very
susceptible to wind and evaporation losses - up to 30% or more in most
cases. HDF has touted the new Zealand model, yet in "dairynz.co.nz-A
farmer's guide to managing farm dairy effluent tells us" Some
'add on' effluent sprinklers to pivots i.e. guns have very poor
distribution uniformity. " What is different with HDF use of gun
irrigation? Can the gun irrigation concepts be seen as a reasonable
irrigation method for any area where water ways are close and
boundaries are tight? What are considered appropriate set backs for
each gun type. Why and What are these setbacks in feet? Has HDF
indicated and defined what offsets and amount of property is within
those offsets.

What HDF usage is intended for the Canal/Ditch as show on page 9
and 32 (last proposal) and explained on page 7.

Can HDF paddocks marked M and S (Manure and Sludge) on page
8 be used as a receptacle for sludge on these paddocks- at random-
and receive an unknown level of Sludge on an "as needed" basis and
still meet a specific nutrient application level for the paddocks
involved?

Given the now known soil conditions (see NRCS Customs Soil
Resource Report for Island of Kauai Exhibit D), why has HDF
determined a 20 ton Kikuyu yield is possible (see the "Is Kikuyu"
reference on page 56). What field tests support that yield level on all
grazing pods or is it yet on a theoretical "hope for" basis?

Although "Kikuyu- Guinea grass" is mentioned in the HDF EIS PN
page 2-2. It was never mentioned in the last HDF proposal. It is a
different nutrient. Will the EIS review confirm this grass
combination? Why would Group 70 have nutrient information not
framed in the submitted proposal? Is it a typo? Should it have been
indicated earlier? How does that affect all other nutrient data? What
other changes have been made in the basic parameters of the dairy
concept? Will all changes to their last proposal be made public and in
what manner? What agencies are now aware of the changes?
Fourth series of comments - questions and concerns

Quote - page 51 - first HDF proposal. "The higher altitudes that feed the reservoir from (Wai'ta) receive very regular and very large amounts of rain." From the center of the Waia reservoir to the HDF milking parlor is 3278 yards. The highest part of the mountain range behind Waia reservoir and Mahaullepu is to the NNW end corner of the Mahaullepu property and approx. 2200 ft. Haupu at the NNE is 2600 feet. In the above sentence is the admission of "very regular and very large amounts of rain." In what manner is this large amount of rain (coming from the high mountain range surrounding the HDF property - and inside a Horseshoe fashion) kept from running through the manure covered field directly into ditches and streams traversing the HDF property. Will surface runoff occur? Does this downhill run off end at the ocean. Was this known? Was it planned? If not why was this certainty ignored?

Quote: "It is commonly believed from recent history that Kauai lays in a more vulnerable position than the other islands. However, in his recent analysis of Hawaiian hurricanes, Dr. Tom Schroeder of the University of Hawaii, Meteorology Department, concludes that every island has been affected by hurricanes and that no island is without risk. The randomness of nature plays a key role in which islands are at highest risk during any given hurricane. In 1988, Hurricane Iniki was poised to hit Oahu or Maui but passed to the south. Hurricane Iniki in 1992, could have hit Oahu or missed the islands altogether, but instead tracked right over Kauai." (Quote) Altas of Natural Hazards in the Hawaiian Coastal Zone. By Charles H. Fletcher III, Eric E. Grossman, Bruce M. Richmond, and Ann E. Gibbs prepared in cooperation with University of Hawaii, State of Hawaii Office of Planning, and National Oceanic and Atmospheric Administration Geologic Investigations. Series I-2731

One of the most significant factors protecting adjoining areas from pollution or over run from effluent ponds is the gallon capacity of the ponds. Federal regulations have guidelines and compliance expectations that must be met. Serious questions have been raised and DOH has sent HDF back to the drawing board for a redo of their effluent ponds capacity. The size and manner of construction is predicated on many factors one of the most prominent is the history of weather events that would create a breach of the ponds. A 24 hour 100 year review of storm participation was offered as proof of compliance by an HDF spokesperson 23 January 2015 (Quote Amy Hennessey Jan21/15 TGI) "Our farm's effluent ponds are designed beyond the requires size to accommodate a 24 hour 100 year rain event." HDF uses the figure of 10.4 inches in a 24 hour time frame.

If only that was true - for their sake if nothing else-; but it isn't true.

A 100 years recap would take too many pages to outline this concern but just taking the high points of the National Oceanic and Atmospheric Administration data from 1850 till 2000 (50 years) will point out how much defining data was ignored or left out by HDF. Specific to Kauai: was Hurricane Hiki in 1950 with 52 inches falling in 4 days, Nina in 1957 with 20 inches of rainfall in 14 hours, Dot in 1959, with the eye directly over Kauai, Iwa in 1982 with all gauges down- listed as Heavy rain, Iniki in 1992 all gauges down- listed as Heavy rain (9 inches at least). If anything was left standing including dairy cows these Hurricanes would have filled the ponds and quickly brought them to an overflowing, runoff stage. What data supports otherwise?

In regard to the endangered shearwater bird much has been said but until recently not enough done to protect this endangered species. A brief chronology follows:

"Hawaiian County Agrees to Pay Restitution and Modify Operations to Resolve Endangered Species Act & Migratory Bird Treaty Act Violations"

HONOLULU - The county of Kauai, Hawaii, has entered into a plea agreement to resolve alleged violations of the Endangered Species Act (ESA) and Migratory Bird Treaty Act (MBTA), the Justice Department announced today. The county today entered a plea of guilty to violating the
MBTA by taking that is killing or wounding, more than 18 migratory birds, specifically Newell's shearwaters (known in the Hawaiian language as 'a'o).

The Newell's shearwater is a threatened species protected under the ESA, and a migratory bird protected under the MBTA. The species is identified as endangered on the International Union for Conservation of Nature red list.

"According to the information, it has been publicly documented since at least 1979 that fledgling Newell's shearwaters are attracted to bright lights which often causes them to circle the lights and fly more passes across any nearby obstacles. This attraction may cause the birds to fly into the light or other obstacles near the light and thereby become killed or injured, or to fly around the lights until they fall to the ground exhausted where the bird may be killed by a car, predator or starvation." On approximately Aug. 3, 2005 and Sept. 16, 2005, as well as on various other dates thereafter, the county was notified by the U.S. Fish and Wildlife Service that its facilities, particularly the lighting at its facilities, were taking protected seabirds, including threatened Newell's shearwaters.

The county was given advice over a number of years that it could minimize take and, among other things, shield its lights.

The information specifies that during each of the past five years some Newell's shearwaters have been killed, or otherwise taken, by lighting at facilities operated by the county.

Starting with the 2011 football season for any night games all lights must be shielded and a similar escrow account funded.

LIHUE — County officials announced Friday that work crews are in the process of manually re-activating the exterior lights at all county facilities to allow nighttime activities to resume.

The lights were manually disconnected just prior to the Newell's Shearwater fledging season from Sept. 15 to Dec. 15 to eliminate the sources of light attraction as part of a plea agreement between the county and the Department of Justice.

The only exceptions allowed were four evening Kauai Interscholastic Federation fall football games.

Other mitigative measures taken thus far by the county to protect Hawaii's threatened and endangered seabirds include: installation of shielded lights at Vidinha, Kapa'a and Hanapepe stadiums, Isenberg Park, Peter Rayno Park and the Lihu'e tennis courts; training on the cultural and ecological importance of the seabirds and bird-friendly practices for all county employees; and a monitoring program with respect to endangered seabirds.

At all other facilities, the lights must be inventoried and measures must be taken to minimize and monitor for take, all on a specific schedule. As of 2011, if such facility lights are to be used at night during the fall season (Sept. 15 until Dec. 15), an escrow account of $100,000 must be funded, with an option to add additional funds in increments. Again, transfers would be made related to any taking that occurs, from the escrow account to one for use to benefit seabirds on Kauai. If and when the fund is exhausted, lights at facilities with taking cannot be turned on at night for the duration of the fall season.

The plea also provides that the county will make a payment of $180,000 to partially repair the harm of past take to an account to be established at the National Fish and Wildlife Foundation for use to benefit protected seabirds on Kauai, and a payment of $30,000 to reduce the harm from anticipated future take. Within the period of probation and prior to the county acquiring an incidental take permit, to the Kauai Humane Society to augment its Save Our Shearwater program.

"The Department of Justice views the taking of protected wildlife as a serious violation of the law, and we are pleased that the county of Kauai is taking action to eliminate the risk of harm to this threatened seabird," said Ignacia S. Moreno, Assistant Attorney General for the Justice Department's Environment and Natural Resources Division. "The county's action will enable residents to continue to use county facilities, while protecting this native species that is part of Hawaii's cultural and natural heritage."
The Endangered Species Act prohibits the unauthorized taking, including harming and harassing, of species listed as threatened or endangered. The Migratory Bird Treaty Act prohibits the unauthorized taking, including wounding or killing, of bird species listed as migratory.

The case is being prosecuted by the Environmental Crime Section, Environment and Natural Resources Division, U.S. Department of Justice.

The TGI on 29 Jan 2015 publishing a concluding cost to Kauai for lighting correctly and taking to full needs of the shearwaters at. One million Nine hundred thousand dollars.

HDF is aware of the high numbers of Shearwaters nesting and flying in the Mahauapeua area of the farm. They are aware that the amount of lighting needed to effectively run the dairy through the night is high. They know they have a night lighting conflict. That conflict of needs must be resolved before or ever the lights go on. It requires a much higher response level than “we’re working on it” or “we care for the shearwater bird.” What by detail is the HDF plan to protect this endanger species? If “shielding” is a remedy what exactly does HDF mean by that term? Describe in detail intensity, glare, range etc. Does the plan met the compliance standards now agreed upon by the county?

How can HDF have lighting bright enough for cows to walk safely each way from a pod, as much as a mile and a half in night time dark conditions, a lighted milk parlor area, a lighted surrounding area for other related activities, and at the same time, protect the endangered shearwater bird as legally demanded?

The Mahauapeua area is known for gusty winds. Kite flying is a noted activity in this area. In this type weather, stability of a non-fixed or un-tethered object is at risk. In 2014 and on HDF Mahauapeua property a full pivot system blew over. The weather was of a moderate storm condition with wind gusts. This incident is fully known by the HDF farm manager Mr. Garmatz, and the New Zealand crew that was assisting construction at that time. This pivot system is a large, tall, 2 support wheel configured, and heavy system of the capacity to cover over 100 acres in a 24 hour time span. This full “rip over” if occurring while spraying effluent would have created an uncontrolled spill. No shut off system reacts on a zero time elapse basis. All VRI systems have an error dimension. What, if any method exists, stabilizes this pivot system when a large random gust hits it? As this system is susceptible to wind gusts when they occur, if operating even if it only is moved, flexed or tilted, from the intend direction, effluent spray will be emitted in uncontrolled and unintended directions. How are the streams protected? Does the farm manager confirm this wind gust blow over incident? Would this type spill be considered under “In Case if an Emergency Spill Leak or Failure during Transportation or Land application” (see proposal page 100)? Why wouldn’t these type spills be seen as a continual factor of use or a certainty over time not an emergency spill or accident? What is the upper HDF numerical limit of wind force uses to determine nonuse of the effluent Irrigation system? The average yearly wind factor for Poipu is 16.2 mile per hour. It is higher at Mahauapeua.

Pivot 1 has a pivot range as measured by Google Earth 27 D ec 2013 from approx. 130 feet at the top North arc point to approximately 70 feet to the lower edge of the pivot circle. Application measures of effluent put down during one rotation appears to be beyond the intake capacity of some soil types. Will the EIS address this issue? What consideration is shown up slope run off? As these applications occur quickly does data support this method of application? At what rate? Will the EIS address the slope issue as it relates to rapid run off rate of effluent, irrigation water or rainfall creating stream pollution?
HDF- EIS-PN Kauai-- Ronald John-

5th series of comments-questions and concerns

"Findings and Recommendations Natural Disaster Survey Report
Hurricane Iniki
September 6 - 13, 1992
Chapter 1. The Event and its Impact
Finding 1.1

‘A small but intense hurricane struck the state of Hawaii during the
afternoon of September 11, 1992. Although all islands felt the storm, the
islands of Kauai and Oahu were most impacted. Seven persons were killed
and about 100 injured; total damage was about $1.8 billion. The south
shore of Kauai near Port Allen took the brunt of the storm with wind gusts
measured to 143 miles per hour (MPH) and water levels (a combination of
storm surge and waves) nearly 30 feet above normal.
Finding 1.2

Because of the apparently weak construction of many buildings, estimates
of wind speed based on building damage may be unreliable. Estimates
based on other indicators showed sustained winds of 130 to 160 MPH
especially in areas where winds are enhanced by terrain.
Recommendation 1.2.1

The NWS should encourage the State of Hawaii to review its building
codes in light of the Iniki damage **.
Coastal Management News page 1: HAWAII INCREASES RESILIENCY
THROUGH HURRICANE FORCE WIND BUILDING DESIGN
STANDARDS
Page 2

The Federal Emergency Management Agency (FEMA)
supported the technical work for Oahu and Kauai. By mid-2008, all wind
speed studies were completed and transmitted to the State Building Code
Council (Council) and offered as technical amendments to the 2006 IBC.

HCZM participated in this effort by helping to draft legislation that
establishes the Council and serving on the State Building Code Committee,
a predecessor to the Council. HCZM provided key testimony to the council,
requesting automatic adoption of the wind standards as a part of the county
IBC adoptions. The Council adopted the wind standards for all four
counties in its final draft of the State Building Code (entering public review
later this year), and required each county to use their specific wind

standards no later than two years after state adoption of the State of
Hawaii as a Special Wind Region.”

Were all HDF buildings including calving sheds, silo storage and feed
storages reviewed and approved to meet these wind standards? What
compliance data was given. If none please explain. What amount of
wind speed/wind load were these structures approve to withstand?.
Are the approving agencies deliberations and recommendations on
this matter readily open for public review? Who approved them and
when?

This dairy is an experiment. As so, it would require a specific set of
contingency planning/ back up for a wide variety of events which might
occur. Fail safe backup assurance if you will. 30% of nutrient needs
are provided by supplemental feeding from automated silo to trough
feeding. Electricity is required. The best of machinery breaks down.
Then what? In the ranch area I came from and based on prior experience
these type needs were anticipated and set aside- be it hay or grain or
other- were available. One can’t recall a government subsidy program, as
exists now, that made up for poor planning. Unusual weather occurring
was a given, not an accident or emergency.

. In a larger purview ie. docks close, on island provider of nutrient
supplies shut down; what is the time limit when this nutrient
expectation can be meet without relying on off site delivery of
additional feed supplies? Where does that restocking come from?
These are just a few examples of an imperfect world.

Ulepon Initiative principal Kayce Datta, in an opinion posted in the
Garden Island Newspaper 15 Feb 2016, used a California dock strike as
an example of the need for their Hawaii based dairy. Wouldn’t such shut
down be more crippling of a nutrient plan that require 30% of their
feed from a state side feed source. If that USA dock strike became a
real problem there are New Zealand dairies with milk to be exported.
Can they also take care of HDF feed source needs?.

No one is against sensible, data supported, properly sited and sized
dairies. That definition does not support the HDF dairy concept nor it being
sited at Mahaulupeu. What are HDF’s fall back positions? In detail, what
major problems could disrupt their ordinary procedures? With full 24
hour operations required, what company, factory, assembly line or
any other system didn’t at some point breakdown? What amount of
down time can HDF handle? What is the remedial action for electrical
systems outages or mechanical problems? The HDF concept requires a high number per hour milking count. Who milks the cow when the milking machine is off line. When the back up solar power system becomes inoperative or depleted then what?

The mention by HDF re: wind break or shelter belt as defined in NCRS Code 380. as being "a multiple row planting of trees will be established...page 57" begs the full meaning of this concept. No effective relief is gained by the limited HDF treatment of this requirement, nor does it appear there is room for such planting. The primary wind direction in that area is from the NNW. Where then should a odor minimization wind break be placed? This area is a large concern being treated with little regard. A serious odor mitigation plan must be required. What is that plan?

The Clean Water Branch Brown Water Advisories are part of the information that would validate runoff problems of the HDF site. Most of the source of that condition in the ocean waters of Mahaulepu Beach comes from streams or ditches traversing the HDF property. This condition is frequent and has existed for years when flood irrigation was the method of irrigating the Mahaulepu Cane and Taro fields. The beginning of the now certain polluted level of the brown water is not known. Those who visit the area know of the long history of brown water there, Many have filmed it. If proof of the now existing and continual runoff displaying the polluted ability of the HDF location is necessary, then rainfall data should be available. The TGI stated in an article titled “All Washed Up” (9 Dec 2013) “According to the National Weather Service Poipu registered 4.33 inches and Kalalau had 3.76.” This was of a condition of just a week before the article and when there was an abundance of brown water in the ocean off Mahaulepu Beach for multiple days. From the data of Surf rider at that time, to the most recent findings of DOH it is definite that the "brown water was and continues to be highly polluted. Will this evidence be considered in the EIS examination of pollution issues?

Question arise regarding the intensive "grubbing, grading, planting and major alteration of the landscape. New ditches and other trenching were begun and finished before permitting. In a jump start and confident mode, it appears that HDF proceeded to do much of this type work before permitting was approved. Google Earth close up imagery Dec 17 2013 show an intensive amount of field work completed over a third at least of the property from Mahaulepu Rd for approx 1800 yards north toward the back end of the property and west to east at a max point of approx 800 yards. Planting efforts are shown and water channels have been already cleaned or created. It appears that added and improved waterways have occurred by December 17 2013. Heavy grading is noted. In addition, field trials are mentioned as having been performed earlier than the permitting date. Under what permitting statute were all the alterations allowed, and at what date did such permitting allow HDF to begin active alterations of the site? Was Grove Farm/or the planning approving agencies aware of the extent of the activity? Does this possible pre-authorized beginning of construction explain the measured significant increase of nutrient, bacteria and sediment in the Waiolopi Stream?- pollution far in excess of state standards-and occurring in higher numbers as they began "work" on the property? Does HDF acknowledge significant pre- permit and present activity beyond statute limitations? What agency onsite inspections have been made by whom and when? -Was compliance to HAR11-55-04 shown? Was a storm water NPDES permit obtained? On what date was it applied for? What dates was it issued? If not seen as needed- Why? Cite the statute that allowed HDF to disregarded HAR 11-55-04.

What “reclaim” or clean up regulations for building on previously contaminated/pollution laden sites prior to subsequent building and commercial use (even if by an ag related industrial endeavor) are required by federal, state or county requirements? If the present levels of measured pollution levels are not first mitigated, increased runoff and contaminants from the HDF addition of a significant higher level of possible pollution would be added to the present volume and level of pollution now being found. One would imagine the Clean Water Act is also involved. Please determine, review and list all “clean up rules covering site use of this existing polluted property.” In this respect advise if compliance to that standard requires the HDF property to be pollution free before beginning. If not- why not?

It appears that the definition or perhaps the difference between point source discharge and non-point discharge is blurred by this new and larger expansion of on fields use of excess manure. HDF has attempted to show its need by data supporting effluent pond use for this concept. What isn’t a
matter of opinion is the dumping of sludge on the M and S (Manure and Sludge) 82 acre Area at the lower left hand corner of the farm (less than 750 ft east of the Koloa Public wells).

HDF is a CAFO as designated by 40 C F R paragraph 412.15. The Clean Water Act 33 U S C in part would assert that this dumping of sludge at least would be in violation of this Act if not by its “storage use” i.e. “not needed” or “an addition beyond usage” but for the certainty of comingling polluted water with that of the Taro Farm. The Taro Farm located at the very bottom of the HDF farm site could become a convenient dumping area for effluent over fill or catch basin for surface water, and then the subsequent drainage to the Taro farm ditch system would run to the ocean (one source removed) as part of their operation.

Grove Farm has shown little hesitancy in removing tenants from areas need by a bigger tenant. The small approximate 13 acre Taro Farm as located, stands out as abutting and surrounded on three sides by HDF property. It is conspicuous by its presence and also by its disregard in HDF planning. That so termed private property requires flood irrigation yet abuts a sludge containment area containing 82 acres. Block F of 54 acres which is described on pp. 73 are perceived as heavy, flood frequently and difficult to crop is also next to the Taro farm. No indication of protection or concern for the Taro Farm is written, and runoff, over spray or intermingling of its water with effluent mixed water was not considered.

The Taro farm abuts Block F described as “characteristically poor draining. This location raises not just interest and suspicion but justifiable questions. A written description re: the interaction terms, and considerations made between Grove Farm, the Taro Farm and HDF needs to be examined and explained. That relationship should be clarified, including what barriers exist which would stem overrun either in or out of the Taro Farm. In that regard there should be provisions outlined in the HDF proposal for involving or protecting the Taro Farm from any type disturbance or incursion. What are these provisions? If none exist- why not? What should be done to consider/ protect the Taro Farm?

There is a high degree of confusion regarding whether the nutrient data, waste management data, etc. is for the ultimate build up of 2000 dairy cows Section 11-200-7, HAR, states: “A group of actions proposed by an agency or an applicant shall be treated as a single action when” The component actions are phases or

increments of a larger total undertaking. A proposed action must be described in its entirety and cannot be broken up into component parts, which if each is taken separately, may have minimal impact on the environment. Segmenting a project in this incremental way to avoid the preparation of an environmental impact statement is forbidden. Are all elements of the plan developed on the basis of full build out parameters? Wouldn’t all other action need to wait until the “larger total undertaking” is sent through review and permitting protocol?

The geometric progressive buildup of calving from the initial 699 dairy cows will build quickly to 2000 AU’s (Animal Units) on HDF property. Obviously an increment of heifers and bull calves, by that process will be grow progressively larger and reach the 2000 mark within 5 years. The next calving cycle beyond 2000 (14 -16 months) will progressively expand the number by that full 2000 amount. HDF will either sells or uses the heifers for additions dairy production. It will also be producing a high number of male calves for sale. There is no indication of calf pen size enlargement or additional excrement from the calf pens into the effluent pond or additional excrement on the paddock when paddock containment is being used for heifer calves. The excrement of calves both in calf pen and on paddock must be represented. What are the amounts considered? Are they shown in the present proposal? That information affects all HDF computations from effluent pond size to nutrient plan. What is the procedure to cap the total number at 2000? Does that 2000 number include calves, yet lactating heifers, and dairy cows? The proposal as written is unclear and unacceptable without more definitive clarity on these multiple issues.

No mention of “dry dairy cow” or “sick dairy cow” is given. Where are they pastured? Are they moved from paddock to paddock? Are they separated and how? Other than the one line on page 91 (last proposal) “Animal Mortality Management Plan”, no mention of a necessary veterinary space location or the cleanup of such area is given.

Recently legal findings were made re: Kauai Bottling Company right to use the Waia reservoir water for commercial sales. Grove Farms testimony is through out some of the narrative. Pioneer has a claim to water (page 31 first proposal) from the pipeline water also used by HDF. If more is needed
by Pioneer HDF would have to acquiesce to their usage of the pipe line water usage if necessary. Quote pp 31 "the pipeline is unlikely to be able to supply required water for irrigation when Pioneer is in full on take." The possibility that future legal action could cloud the entire water use of Waia reservoir use is evident. This must be recognized in an EIS review and a consideration if HDF planning. Has it been? In what manner?

Little if any data used to support the present concept is usable to support a Confined CAFO conversion or to start initially as one. See 2-3 HDF EIS PN What factors supports this alternate as a "viable" one? Why?

Page 5 -1st proposal under Design Consideration indicates “Cow races need crossing solutions (culvert and bridges) at three points over the stream which passes through the dairy farm” No explanation of how the stream is protected from manure and feces deposited while traversing these cross over points exist. Are protective side curbs on those direct outlets provided? Both, at the approach to these culvert and bridges while on the bridges and at exit points, would side barrier containment? Where does the excrement during these crossing go and how is it contained?

There is a fresh water "Lake Pond" abutting the HDF property line (upper left corner and on pp20) (Redacted proposal) shown as discharging into a "canal/ditch" traversing the property and then leaving the property just above the area marked milking parlor at pod 10S. No protection of that ditch from pollution from the cited gun style (65 feet range) effluent emission spray or other excrement spillage is given. Why?

Given a 2000 number of perfect automated cows and perfect systems working at max level, the time to transition a mob of 300 cows both up to the milking parlor, milk, and feed, and back to that same pod relies on human workers and with that less than perfect variable, it is questionable that all the perfect cows could be milk in the time required for 2 milkings per day. Add to the slow walking dairy cow of reality, carrying a full udder of an average 10 lbs weight as she goes to the milking parlor and down time becomes a serious draw back of a scheme based on what might work for a Confined CAFO setup. No rancher nor any one who has trailed cattle would tell you otherwise. If two mobs are grazing on padds near one another you cannot get the first of the two mobs of 300 back to its same pod (most pod distances are at least 800 yards from the milking area and many a mile away) while at the same time bring the next 300 cow mob up the same raceway. This is not “3 little pigs going to market”, but 300 dairy cows strung along “walkways and races” 16 to 20 feet in width (page 21 last HDF proposal) and often in poor, sloppy, weather. This concept won’t work. At this time a reality based plan must be defined and explained. What is that plan?

Waste Utilization-Field Office Technical Guide NRCS Section IV
Where the residues of energy production are to be land-applied for crop nutrient use or soil conditioning, the criteria listed above shall apply.
CONSIDERATIONS
The effect of Waste Utilization on the water budget should be considered, particularly where a shallow ground water table is present or in areas prone to runoff. Limit waste application to the volume of liquid that can be stored in the root zone. Agricultural wastes contain pathogens and other disease-causing organisms. Wastes should be utilized in a manner that minimizes their disease potential. Priority areas for land application of wastes should be on gentle slopes located as far as possible from waterways. When wastes are applied on more sloping land or land adjacent to waterways, other conservation practices should be installed to reduce the potential for offsite transport of waste. It is preferable to apply wastes on pastures and hay land soon after cutting or grazing before re-growth has occurred. Minimize environmental impact of land applied waste by limiting the quantity of waste applied to the rates determined using the practice standard Nutrient Management(590) for all waste utilization. Consider the net effect of waste utilization on greenhouse gas emissions and carbon sequestration.

It is difficult to examine the HDF proposal and find really based concepts that effectively meet these NCRS criteria. Some of the NCRS criteria have been simply ignored in the HDF proposal, and that is a significant concern. By field elevation data obtained from Google Earth one finds a number of varied field level elevations within the overall 100 ft elevation decrease extending from the northern most end of the HDF property to Mahaulepu Road. Measuring across the fields- West edge to East edge- multiple
The expected procedure in this area? Will the EIS review process examine the question of whether nutrients overwhelm the absorptive capacity of the soil, and either run off or will be leached into the groundwater? The maximum allowable rate of application (inches per hour) to prevent runoff depends on the intake rate of the soil. This basic underpinning of application rate is continually conflicted by HDFs own indications. Will the EIS review this specific compliance need?

Conspicuous by its presences and also by its disregard by HDF planning is a Taro Farm in the lower left hand quadrant of the property. This private property requires flood irrigation yet abuts a sludge containment area containing 82 acres and block F of 54 acres which is described on pg73 as perceived as heavy, flood frequently and difficult to crop. No indication of protection or concern for the Taro Farm is written, nor is runoff, over spray or intermingling of its water with effluent mixed water considered in the HDF proposal. Why not? What should be done to protect the Taro Farm?

HDF on page 73 explains Block F-Special Management. They restrict the Block size to 54 acres. Abutting and continuing north of Block F are Pod 211 through 218 and still connected farther north include Pod 121 through 124 and to their west Pod 101 through 104. All these connected and additional pods are of like soil types. Why is the total area of connected like soil i.e. "heavy, flood frequently" "characteristically poor draining" treated in a different manner.
A general rule but specific to the HDF flow of multiple proposals is: "When a significant and substantive change or changes occur in a proposal document creates a significant and substantive difference in the body of the proposal (multiple data points/factors) the entire approval process must begin again." Was West Kauai Soil and Water Conservation District notified that the proposal as presented contained direct opposite soil ratings? After that acknowledgement did West Kauai Soil and Water Conservation District approve and NRSC examine the most recent proposal? What actual data should have been considered by these agencies? What adjustments did DOH have to make when the true data was given to them?

There is a conflict by nomenclature misrepresentation implicit in the HDF statement page 7- 2.2.1 Quote "The drainage ways within Mahalepu Valley and within the project-----these canals and ditches flow—These are other water ways than ditches and canals on this property, HDF calls them "unnamed drainage way" Why wouldn't they know the names? Actually, two historical streams (Kapunakea and Waialau) consolidate into one and enter the class A ocean at the end of Mahalepu Beach near the Makuwahi Cave Reserves. The HDF type of generalized terminology is replete throughout the proposal and should be noted and considered in the EIS review.

In earthquake planning for retrofitting or design of new buildings the terms "worst case scenario" or "significant events" are primary to setting the parameters to be met. From Waste management through Nutrient plans, HDF appears to misunderstand that basic protective need. HDF proposal language speaks in terms of "average" There is nothing precise in that term. Words like "assume" have no place nor is a sensitive, critical factor presented as "observed." "Average" is not "actual." "Average" is an artificial indicator of a wide bandwidth of conditions not one specific condition only. You do not develop plans for developments such as an experimental dairy project based on average, generalizations, or probability but build on a standard of "possibility of" and specifics. Does HDFs proposal content met that necessary threshold and does EIS reviewers see this specificity as necessary? The bar of acceptance for approving the contents of their proposal data would be below any normal standard of acceptance if a dairy design of this nature was given a permit based on such loose linguistic presentation."

When specifics are given such as page 39 first proposal- sentences like "Buried pipe will be installed at sufficient depth below the ground surface to provide protection from hazards by traffic loads, farming operations freezing temperature----this level of document preparation speak of "cut and paste" and no attention to content applicability. "Freezing temperature" this after 5 years of studying? This parameter for a Hawaii based dairy farm? Isn't specificity and accuracy required in proposals of this nature? If anyone is to find legitimate support for this project, conclusory assertions must be replaced by data and that data being interpreted correctly. At this time the deficits in HDF's presentation are obvious and if left to stand unacceptable. It is a seriously flawed attempt pointing to little academic discipline and an abundance of unconcern. What should/can be done to gain the precision required? In itself this proposal is as flawed as its concept, and by its self should be rejected. On what merit is this proposal deemed acceptable by any objective reviewer?

What can one determine from the admission of Quote pp. 53 first proposal? "Water application will be at rates that minimize transport of sediment, nutrients, and chemicals to surface waters, and that minimize transport nutrients and chemicals to ground water." From "establish and operate the zero discharge grass fed dairy" in next breath to "minimize transport" to surface waters and ground water. Is this admission not clear in its intent? Minimize does not enhance nor describe compliance to "zero discharge." What does minimize represent to HDF? What outcome is unclear in that admission statement?

The continuous effluent bath of the pods already holding a significant amount of fecal material will over time significantly affect the water systems and ground water. That is a certainty as is the eventual
nonproductive capacity of the soil. Why is this ignored? What information or data in the proposal support a different conclusion?

Quote New Zealand Dairy Farm Guide “Sloping land (>7”) or land with hump and hollow drainage refers to soils which are gently rolling to steep. Also includes soils which have been humped and hollowed. The main risk is runoff on these soils. Management tips: application depth must be less than soil water deficit and application rate must be less than soil infiltration rate.” Page 12 HDF proposal lists 7 of the soil types having slopes in excess of that rule. What does HDF do to rectify this discrepancy in irrigation concept? Was humped and hollowed contouring done on the HDF property? Were contours sloped toward the water outlets when grading was being done? What contour maps were used during the grading of the HDF property? What contour changes were made? Prior ground elevations are available on Google Earth. What does present satellite imagery show?

The HDF pivot system is a large, tall, 2 support wheel configured, heavy system of the capacity to cover over 100 acres in a 24 hour time span. The full “tip over” of 2014 if occurring while spraying effluent would have created a uncontrollably spill. No shut off system reacts on a zero time elapse basis. All VR1 systems have an error dimension. What if any method exists, stabilizes this pivot system when a random unpredictable gust hits? As this system is obviously susceptible to wind gusts when they occur, even if only moved, flexed or tilted, from the intend direction, effluent spray will be emitted in uncontrollable and unintended directions. How are the waterways protected? Does the farm manager confirm the 2014 wind blow over incident? Would this type spill be considered under “In Case if an Emergency Spill Leak or Failure during Transportation or Land application” (see proposal page 100)? Why would the 2014 blow down not be seen as a factor common to its use not an accident? What is the upper HDF numerical limit of wind force uses to determine nonuse or “stand down” of the effluent/irrigation system? The average yearly wind factor for Poipu is 16.2 mile per hour. It is higher and more varied as you go up toward the mountains. What are those readings?

What are the weight and size dimensions of the pivot system wheel sets, their width and weight per unit? How many wheel systems per pivot and what is the total weight load on an individual wheel section when in full operation. What is the distance to the outer gun system and what is the tracking speed of the outer pivot? Wheel rutting is common to all pivot systems. It is more so when one is as large and heavy as that HDF is using. What are the single wheel width and weight dimensions? Within a short time of use distinctive tracking/rutting paths will occur. When either prepped as a hard surface or becoming one when in the clay areas of the fielding-how will rutting be prevented and runoff not occur from these tracks? As these tracks become fixed, permanent pathways, they will become quickly visual and distinct. They will become multiple miles of circular conduits where any irrigation water or effluent can be carried away. These certain depressions will either hold or runoff to other areas. If the tracks are hard surfaced by design then they now become pathways/walkways, much as raceways etc. They, by known function, become “discharge” areas. If intended they will, if not hard surface designed, become depressions holding standing water in stagnating pools. If accessible, animals of all types drink from them. As much or more than walkways raceways etc, these certain channels must be considered and runoff to them and beyond controlled. Will the EIS address that need? There is considerable fluctuation of elevations determined by Google Earth Dec 2013 which not only impedes a pivot system but can as well stall or shut one down. What is the shutdown emergency reaction time? Why did it not work in the 2014 tip over? How many wheel sections are in Pivot 1 and Pivot 2? What is the circumference of the pivot circles? What is the combined total mileage length of the different pivot tracks?

Do the pivots/wheel systems cross waterways? By what means? A pivot system cannot be shielded in such manner that pollutants aren’t
carried and dropped into waterways from the body parts/hardware of the pivot equipment while passing over it. The entire functional reality in this context must be evaluated. What is the lag time between signal and full shut off (no residual drip)? Is each section of the pivot system pressure regulated? What is the lag time from shutoff signal to pressure to zero on the outgoing flow?

In trials ran on VRI equipment (ASABE Technical Library) a catch can test on a S3-VRI equipped pivot system resulted in evaporation and drift loss at an average of 9.3% and ranged from 1% to 19% the question again is: Given that data how can zero discharge be assured?

Page 54 mentions a "4 inch underground pipe to a number of hydrants" for carrying suspended solids to the paddocks. 4 inches under the ground-ground now disturbed/looseened by the burial of pipe and, heavy weight pivot wheel systems crossing these pipes. Can that pipe withstand the weight load of a pivot system wheel section? Is this gun section limited to the 82 acres M and S area only or all areas "outside the liquid effluent application" (page 54 new proposal). What paddocks by number are involved in this concept?

At this point of time, (4Feb 2014) measured levels of pollution have been determined at multiple levels above a safe number and these polluted waters running into the ocean affect the "protect conditions" exactly as described above. The reason for the disregard/disconnect from regulatory statues listed above and the certain continued pollution must be explained in reality based parameters. In that context HDF must explained, beyond the usual generalities, how they intend to meet non pollution requirements.

There are multiple general explanations intermingled with varied specifications of acreage that will be used for grazing/paddock. With all setbacks considered: raceways, milk parlor silo, storage, graveyard etc. What is the specific total number of acres that a dairy cow will generally occupy for grazing purposes only? Please detail those pods and acre amounts?.

With the average mortality rate given dairy cows what data justifies and supports the small ("about 4400 sq. feet") only set aside (see page 101)? Two thousand dairy cows and a tenth of acre "Animal Cemetery" is not a sensible projection. The average mortality rate of dairy cows at this time is in the 5% yearly range. "The new and higher rate may be due to regulatory change in the United States. when at end of December 2003 new regulations required euthanasia of downer cows to prohibit use in human food supply channels(USDA, 2003). That change would be expected to shift DHI reporting of reason for lactation termination from "sold for slaughter or salvage" (formerly "sold for beef") to "died" (Animal Improvement Programs Laboratory,2007), as noted by Fetrow et al. (2006). On page 12 and 13 Table 5 One category displays "Depth to Water table" That soil category of the Animal Cemetery is shown as greater than 80 inches. On page 97 HDF indicates "Pits will never go deeper than 8 ft (96 inches) This is but one example of disjointed, multiple and serious conflicts in their own data. For all they know that's at a water level or close. What burial depth can one assume will be used? At full build out of a 2000 dairy cow, the annual 5% mortality rate would mean approximately 100 burials a year in a space no bigger than most single family building lots. What explains this discrepancy in space requirement needs? In addition, the placement of the HDF "Animal Cemetery" is near a stream, and in situated in an area where mountainside rain runoff is peak. None of this placement makes sense and it must. What should be considered as an appropriate site and size if the Animal Cemetery carcass disposal is as planned? Given storm water infiltration: at the level of burial depth when does leaching of the decomposing carcasses occur and percolate to the ground water begin? Do the math: 2 ft wide- 5 ft minimum length -3 ft separation of burial site. Where and when does HDF start the next site? Was any conversations held with any slaughterhouse owners re: disposal of the dairy cows? Was conversations re: this matter held with slaughterhouse owner Willie Sanchez? What are HDF slaughter house needs? For what purpose will HDF use a slaughter house?
In seismic planning for retrofitting or design of new buildings the terms “worst case scenario” or “significant events” are primary to setting the parameters to be met. From Waste management through Nutrient plans HDF’s presentation appears to misunderstand that basic expectation. HDF language speaks in terms of “average.” There is nothing precise in that term. Words like “assume” have no place, nor is a sensitive factor presented as “observed.” “Average” is not “actual” nor does it bear the weight of requirements that must be based on actual measurements. Average has a wide bandwidth, not one singular condition only. You do not develop plans for developments, such as an experimental dairy project, based on average, generalizations, or probability, but build on “possibility of” and specifics. If anyone is to find legitimate support for this project, conclusory assertions must be replaced by data and that data being interpreted correctly. At this time the deficits in HDF’s presentation are obvious and if left to stand unacceptable. What should be done to gain the validity and precision required for this proposal?

The well system serving Koloa and Poipu is not as depicted (Quote: Page 12 HDF proposal) “The Koloa F well is located 1/2 mile away.” The purpose of that HDF statement denies reasonable explanation and frankly is suspect. Wells F and other public wells in the same area are within 350-750 feet. There is a host of questions. How and why can such mistake in measurement be committed? Were any water officials consulted? When? With whom, and for what reason? Did HDF know that the County wells provided water for all of Poipu and most of Koloa? What EIS reviewers will be involved in reviewing this area? The same footprint over the aquifer where the well is sited is shared by the 82 acre Manure and Sludge area of HDF. Were the county officials made aware that abutting the actual well system was 82 acres of drip system irrigated manure and sludge (M and S) not only next to but on top of the ground water aquifer feeding those wells? The questions now listed concerning this matter are but few of those in this specific area that require scrutiny and factual explanation. Why in particular was “1/2 mile” used as an indicated offset distance figure from the wells, and not the true figure?

On page 54 3rd proposal one reads “gun type application system to area outside the liquid effluent application” Those areas are on the fringe areas of the property. On page 54 Redacted and 3rd proposal they reference the gun and their 65 foot radius of spray area will be moved around the paddocks. The first gun type is mounted on the pivot ends. The second gun system is hydrant mounted guns used in the paddocks. Some paddocks, almost the closest property to Mauahulepu Rd will be covered by the first method. Use of the hydrant mounted gun system in other paddocks sets aside all the assurances and claimed precision of the VR system of irrigation. It is a known wrong and primitive solution never to be used to spray potential pollutants in sensitive areas. It literally cuts corners (see 442-page 8 FOTG “Irregularly shaped pen areas that are impractical to treat with a sprinkler system”) How many of the paddocks are irregularly shaped? Gun sprinklers should not be allowed. It is a rare reader that has not been hit by wind-blown sprinkler spray of gun type. At the Mahaulepu site are multiple water ways within a sprinkler span. For example (See page 32 (canal/ditch) running through the lower right corner of the property and which they will irrigate by pivot end gun use. A gun type irrigation system spraying effluent will with wind drift create a combination of pollution either by odor, mist or both. Its error rate is high, it precision and sprinkler uniformity low. The sweep is outward, frequently random and its scatter at the whim of the wind. With sensitive stream areas nearby no error variable should be in play. Given the multiple streams proximity and irrigation systems What data exists that would support this method as a reasonable irrigation method for either irrigation application concept HDF intends to uses? Why?

HDF must demonstrate how they will comply not just they will comply to irrigation standards. Under NRCS FOTG Sec. 4 page 6 through 9 they must specifically relate each of the requirements to their field irrigation concept, and to the hardware used for such irrigation. HDF must demonstrate an understanding of and compliance to all regulations governing dairy operations. That compliance must be written, and open for EIS review.
The HDF Impending purchase of Clover Leaf Dairy on the Big Island, should be considered under "cumulatively has a considerable effect" language or "commitment for larger actions" criteria 8 of the ESI Significant Criteria. Will this matter be reviewed? This purchase is HDF's second effort toward an announced 10000 dairy cow constellation. That figure points to a additional 10000 calving number every 14 to 16 months and higher each lactation period. Quotes by the present owner, Ed Boteiło, raise serious concern. The following quote is part of an article "Dairy farming in Paradise: Dairying Across America: Hawaii"

"Our land runs right down to the Pacific Ocean," said Ed Boteiło, the farm's operator. "On a clear day, you can see some of the other islands. During the winter we often see whales swimming by." (2 full color photos were included with captions)

The admission ("Our land runs right down to the Pacific Ocean.") underpins the worst ecological/environmental disaster New Zealand has faced in modern history.

The picture as captioned in the article is of itself revealing. A single dairy cow grazing as a giant cruise liner passes by. However, what it reveals is not to many a magnificent, bucolic scene depicting the grandeur of spectacular agricultural setting. It could as well illustrate the greatest ecological/environmental disaster yet experienced in New Zealand and certainly all over England, France and the America's to name but a few of those area devastated by a lack of environmental concern. It could represent the single rule we are learning much to slow. "Large consolidations of cattle enclosed in confined spaces next to or over water bodies can create serious and lasting pollution."

Under the "prevent language" of 344-1, In what manner does one alert/involve government agencies regarding this pollution possibility? Does DOH have stream pollution readings of the Kahalo Ditch or at the ocean as the stream run off leaves the Clover Leaf Dairy? All major dairy pollution started with a small amount of dairy cows. Hawaii must take in advisement the yet unstudied environmental impact of this collective HDF effort. What regulations cover the cumulative pollution possibility of this next step toward an intended 10000 dairy cow build up? 10000 dairy cows mean within 14-16 months 10000 calves. Then what?

If this uncontrolled concept can ruin New Zealand (an island) as it has, the Big Island area size pales in comparison.

Prior to HDF's last proposal submittal a "NRCS Customs Soil Resource Report for Island of Kauai Hawaii" was published. Interestingly it covers and is limited to the Mahaulpeu HDF property site. It points out clearly what HDF should have noted and considered in the last submitted proposal. It has been indicated by NRCS that the reason for that research report at that time and requesting agency are secret and protected, yet no search of the series 401 regulations, have been found that impose such secrecy/privacy protocol.

General Manual
Part 450 - Technology
Who requested the above referenced specific NRCS Customs Soil Resource Report for Island of Kauai? When? When was it given to the requesting party?

If HDF was aware of this data, an intentional disregard for the data contained in the NRCS Customs Soil Resource Report for Island of Kauai Hawaii has occurred. That significant "error of omission" requires open explanation. Will the EIS process evaluate this concern? If HDF was the requesting party then ignoring its content creates a serious breach in protocol governing multiple governmental agencies. The aforementioned report is an objective analysis. It points out with critical science based data why HDF is not a project suited to this particular site. Did HDF have knowledge of the existence of the NRCS Customs Soil Resource Report for Island of Kauai? If not—Why not? Has effort been made by HDF to now integrate or respond to the data in this report? What efforts by detail have been made?

No expert, shown this report by the writer, including one former farm loan bank officer, have found it as supporting- in any way- this concept- at this site. On the contrary the report is a stand alone analysis of which no one could deny its data or impact. One reviewer with shaking head ask what is their real intent for the use of this land? Is the financial backing source—Pierre Omidyar- or Kyle Datta aware of the findings contained in this report? Is Pierre Omidyar aware of the EIS review or this report? Why was it clear, concise findings ignored? Why even now is it ignored,
not acknowledged or considered by HDF in formal presentations? What data based facts can outweigh the burden of evidence contained in the NRCS Customs Soil Resource Report for Island of Kauai? Will the EIS take in consideration the full import of this report? In what manner and by which of the review agencies will it be considered?

In the area of professional preparation: has Group 70 ever developed or evaluated a Waste Management Plan of a dairy similar to the one proposed by HDF? When? Where? What other dairies have they designed waste management plans for?

In closing: Proposals made to approving entities are to explain not to confuse. They should alleviate fear or tensions, assure that no damage or harm exists in what is proposed. Some include a clear validation of its need or necessity. This expectation was not met by the one now being considered.

Those of us voicing concerns are for reasonably sized and sited dairies. None of us believe Mahualepu is a legitimate choice. As there exists a difference between legal and ethical, there too is a difference between could and should.

Pierre Omicyar, Ulepono Initiative, and Hawaii Dairy Farms should do the right thing.
Dear Ronald O. John:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**GROUP 70 OBJECTIVITY:** Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai'i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai'i Revised Statutes and the "Environmental Impact Statement Rules" (Chapter 200 of Title 11, Hawai'i Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State and Federal agency. On numerous past EIS projects, the Hawai'i Chapter of the American Planning Association has recognized Group 70's professional work with Chapter awards for excellence in environmental planning. Part of the EIS scoping process involves Group 70's experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai'i Dairy Farms Environmental Impact Statement.
A second round of field sampling was conducted in 2015 and focused on evaluating soil electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of growth, to absorb and hold rainwater for during dryer periods, to filter and reduce the potential for impacts on waterbodies. Poorly drained soils are not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas "drainage" refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil profile. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential to off-set up to one-third of the annual increase in atmospheric carbon dioxide.

Soil conservation is a core principle behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in the United States. NRCS is a technical consultant that can be engaged to provide services for soil conservation, and to provide habitat for soil microorganisms. The NRCS provides a wide range of technical assistance to landowners, including soil conservation, water quality, and wildlife management. NRCS technical assistance can include soil testing, field studies, and analysis on water quality and ground water resources in the area. The NRCS was established to define an area of interest, conduct data collection, and generate a Custom Soil Conservation Plan (CSCP). The CSCP includes a CAPRIC (Conservation Assessment Plan Research Information Catalog) database that is customized for the area of interest.

The NRCS, with its classification and descriptions, provides a good information base for developing and implementing conservation practices. The NRCS classification system is designed to provide a comprehensive assessment of soil properties, including soil type, texture, structure, and depth. The NRCS system is used to identify existing soil nutrient levels and to define areas of interest. This is particularly important for dairy farms, as the quality of groundwater and surface water is documented.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States, and NRCS personnel are engaged in the assessment of soil type, texture, structure, and depth. The NRCS uses a variety of methods, including soil testing, field studies, and analysis on water quality and ground water resources in the area. The NRCS provides a wide range of technical assistance to landowners, including soil conservation, water quality, and wildlife management. NRCS technical assistance can include soil testing, field studies, and analysis on water quality and ground water resources in the area.

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Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā`ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F Well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po`ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po`ipū - Kāhele districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā`ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā`ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā`ulepū Valley, which is fed by several intermittent streams coming off the south slope of the Ha`upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and empty into the lower Māhā`ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction...
Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and a areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part 1 of its report: Waiopili Ditch Sanitary Survey, Kauai, Part 1. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Efficient Irrigation and Commercial Fertilizer Application. The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size, supplemental nitrogen will be needed, and assurance/quality control requirements, and it could not be used for regulatory purposes. The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa- Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal
area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

NATURAL HAZARDS: The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhā‘ulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai‘i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone. The Kaua‘i and N‘ahāhau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands.

Although they occur infrequently, Kaua‘i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhā‘ulepū region during and following the hurricanes that affected Kaua‘i in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent pond since rainfall has been recorded in Māhā‘ulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua‘i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricanes, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a wind rose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line. Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling technique to estimate odor dispersion under various meteorologic conditions.
...odors may be introduced to the HDF site with effluent ponds. The HDF system is designed to utilize 100 percent of the treated wastewater effluent as a local food source.

The term "grass-fed" was used in the HDF EIS. This term was used to identify the amount of nutrients anticipated from the manure of cattle grazing at HDF. Manure from cattle grazing on pasture is a natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed, thereby reducing the cost of production for dairy cows at HDF. This term is not used in the EIS.

Odor emission sources identified for modeling at HDF were manure in the pasture and effluent ponds. Odor models were adapted to reflect the HDF facilities. Modeling results were generated for worst case meteorological conditions (low wind speed, high humidity). The odor plume would extend to the south of the HDF site. Results for the committed herd size of 699 mature dairy cows show odor would not exceed 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odor would not exceed beyond 2,780 feet outside the HDF boundaries. The potential odor plumes would be limited to 50 percent of the sensitive population. The results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area footprint will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.5, Architecture and Engineering.

The pastoral rotational-grazing dairy provides a local food source — grass — as the natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed, thereby reducing the cost of production for dairy cows at HDF. This term is not used in the EIS.

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Healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through the pivot irrigation system or through gun irrigation. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm. The pivot irrigation system is controlled using computer software and GPS receivers to allow for very precise application of irrigation and/or diluted effluent on the pasture. The growth, to absorb and hold nutrients, is highly unlikely that the storage pond will be full at any time for the committed cow herd. HDF will follow the developed Conservation Plan, which is in accordance with the regulations for animal agriculture activities. Two rounds of independent soil sampling and laboratory tests of soil for traces of antibiotic residue will be conducted. HDF will utilize the Soil Conservation Standards that provide a scientific basis for the effects of animal agriculture activities on the environment.

Towards maintaining water quality, the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) provides technical guidance on applying agricultural waste. The NRCS Conservation Practice Standard 260, Nutrient Management, applies to the fields. It covers the management of surface water and groundwater, and non-point source pollution from animal agriculture activities. The standard is based on the Science-Based Tools and Standards in Agronomy, Water Quality Management, and Water Quality Protection, Handbook 233, developed and published by the USDA NRCS.

The soil on the site is a loamy silt, which can be managed to provide nutrients for plant growth. The soil is also used as a resource, it is being used for the constituent components that provide benefit. The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic byproducts, waste water, organic matter, and water quality. The standard is based on the Water Quality Management Handbook 233, developed and published by the USDA NRCS.

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The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalbi Clay at 32 percent, Kāʻena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, microminerals and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as "poorly drained", and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas "drainage" refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential for impacts on waterbodies. In this way, "poorly drained" soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than "well drained" soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai‘i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

**DEMOGRAPHIC AND ECONOMIC**

The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, up to a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately 8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.
Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**FLORA AND FAUNA:** Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened or proposed for listing under Federal or the State of Hawai‘i’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plant species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhā‘ulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kauai may overfly the site. The endangered Hawaiian goose, nēnē was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kūlos area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to the five endangered species include lowering construction cranes at night, using conservation fencing to project-specific areas, marking tall structures and fencing with white visibility polytype, limiting nighttime lighting, and shading any outside lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaii Dairy Farms”: [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

**GROUP 70 INTERNATIONAL, INC.**

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
February 22, 2015

Ms. Laura McElroye
State of Hawai'i, Department of Health
1250 Punchbowl Street
Honolulu, HI 96813

Mr. Jeff Overto
Group 70 International, Inc.
925 Bethel Street (5th Floor)
Honolulu, HI 96813

Hawai'i Dairy Farms, LLC.
P. O. Box 1690.
Koloa, HI 96755-1690

Dear Madam or Sir:

I am responding for my wife and I to the Call for Inputs that will help to define the scope of the Environmental impact Statement ("EIS") to be prepared during the coming months related to the proposed Hawai'i Dairy Farm ("HDF") in Maha'ulepu Valley, Kauai, Hawaii. We have the following concerns and hope they will be subjects of investigations during the EIS preparation:

1. We own a unit in the Poipu Sands condominium located in the Poipu Kai Resort situated just west of the Grand Hyatt Hotel and Resort. The trade winds generally come from the northeast which would bring any odors from the HDF through our property. As past Wyoming cattle ranchers we know of the odors that develop from a stationary herd of cattle. These smells are expected around ranches and other areas where cattle are confined, but are not expected in Hawai'i. If these odors transit from the proposed HDF it will impact not only our enjoyment of stays on Kauai but also income we obtain by transient rentals of our condominium unit. There is also the possibility (likelihood?) that the sounds of cattle mooing will be carried on the trade winds and heard through the day and night at the Hyatt and in the Poipu Kai Resort.

2. We have owned our condominium unit for 25 years and have enjoyed the Maha'ulepu Beach area during that period although we now hear that the waters in the area are unfortunately polluted, although investigations are underway to find out why and to try and recover the beach water quality. But this will possibly be impossible if cattle waste causes soil damage that permeates and/or transits to the south and to the Maha'ulepu Beach. This we believe should be avoided to preserve the environment in and around the Maha'ulepu Valley and beach area.

3. The two concerns above would, if negatively impacted by the HDF, cause a large financial loss to the County of Kauai. With the ease of transferring information through the public domain using today's internet system, it would soon become common knowledge that the south shore of Kauai is no longer the place to vacation and/or live. This would create a large hardship for current property owners within a few miles of the HDF facility (and likely throughout the rest of the south shore resort area), and would certainly cause very large income reductions at the Grand Hyatt Hotel and Resort. All of these financial impacts would certainly change the current economic welfare of the community south of Koloa, Kauai, Hawai'i and a very significant reduction of County of Kauai property tax revenues and State of Hawai'i GET and TAT revenue collections.

4. Finally, we are unaware of an environmental restoration plan should the HDF be allowed to proceed with their plans which eventually do cause unacceptable damage even though the damage was not anticipated.

These are just a few of our concerns as long-term owners of south shore property, property whose financial value would likely be significantly damaged by HDF operation. If this occurs, the Kauai south shore area will certainly degrade and become drastically different than it is today.

Very truly yours,

Vince and Fran Jones
Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials operations and applicable engineering standards. HDR will follow the developed Conservation Plan, which was approved by the West Kaua'i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this project were generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data sets are included as Appendix C of the Draft EIS.

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In this way, "poorly drained" soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than "well drained" soils (Yost, 2016). As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soils types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai'i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy's focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

NOISE: Existing noise conditions of the projectsite and the surrounding Māhū'ulepū valley area are evaluated in the Draft Environmental Impact Statement (EIS), along with anticipated short-term and long-term noise conditions associated with the dairy farm and planned mitigation actions. Draft EIS Section 4.12 addresses noise conditions.

Noise can be defined as unwanted sound, a sound that is considered loud or unpleasant, and/or sound that causes disturbance. Research related to noise and livestock focuses on noise levels and minimization of unexpected sounds that cause undue stress on cows. Noise stress results in loss of livestock productivity and thereby financial loss to farmers and ranchers. Little research exists on the sound levels from livestock.

Sound is measured in decibels (dB). The State of Hawai'i Department of Health (DOH) rules use the A-weighting sound network (DBA) in the HAR §11-46, Community Noise Control. Sound through the air is similar to ripples on a pond of water. In open space without reflection, ripples spread uniformly in all directions and decrease in amplitude further from the source. In free field conditions such as outdoors, amplitude drops by half as distance doubles (OSHA, 2016). When sound passes close to absorbing ground cover such as grassland and fields, the "soft ground" absorbs extra sound as it passes. The Hawai'i Dairy Farms (HDF) site in Māhū'ulepū Valley is approximately 2 miles from the resort area, and 1.5 miles from the closest residential areas (on land zoned for agriculture). Typical noise currently generated near the HDF site includes truck ingress/egress along private farm roads, agricultural equipment, and cattle and sheep.

Construction work at the project site will involve activities that may generate an increase in noise levels. However, such exposures will be a short-term condition, occurring during daylight hours. Construction vehicles and activities must comply with DOH Administrative Rules. DOH noise control regulation requires a permit for construction activities that emit noise in excess of 7 decibels or that cost a total of more than $250,000. Mitigation measures to minimize construction noise will include the use of mufflers to suppress loud equipment and limitations on the hours of heavy equipment operation.

The dairy farm will utilize milking equipment contained in the milking parlor, and will use field equipment such as tractors. Under HAR §11-46, agriculture is classified as Zoning District C, which specifies maximum permissible sound levels of 70 dBA in the daytime and 70 dBA at nighttime. Dairy operations will generate noise in keeping with agricultural zoning of the parcel. The primary noise receptors in the area would be farmers working nearby parcels. Noise from the dairy will not exceed the DOH threshold, and will not contribute to excessive noise in the region.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai'i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Pusch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua'i, and 8 on O'ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment associated with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua'i.

The HDF project would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai'i Island), approximately 10 percent of Hawai'i's milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua'i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O'ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (367,197,780 pounds) of milk would be
The groundwater and surface water analysis for this Draft EIS examined four studies that were conducted in the vicinity of the proposed dairy site. The studies examined the potential impact of the dairy on groundwater quality, water levels, and the quality of surface water. The studies were conducted by independent consultants and included a review of existing data and the development of new data.

The results of the groundwater studies indicate that the proposed dairy may affect the quality of groundwater in the area. The studies found that the proposed dairy may increase the concentration of nutrients in the groundwater. The studies also found that the proposed dairy may increase the concentration of metals in the groundwater. The studies did not find any significant increase in the concentration of pesticides in the groundwater.

The results of the surface water studies indicate that the proposed dairy may affect the quality of surface water in the area. The studies found that the proposed dairy may increase the concentration of nutrients in surface water. The studies also found that the proposed dairy may increase the concentration of metals in surface water. The studies did not find any significant increase in the concentration of pesticides in surface water.

The results of the groundwater and surface water studies indicate that the proposed dairy may have a significant impact on the quality of groundwater and surface water in the area. The results also indicate that the proposed dairy may have a significant impact on the quality of surface water in the area. The results of the studies are included in Appendix D.
Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 3,24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the Department of Health (DOH) and provided its data; however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a ‘Sanitary Survey‘ of the Māhā‘ulepū and adjacent watershed. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations: Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles 15 feet from the source of drainage (totaling 70-feet in width) to keep cows away from surface waters. Fences will be erected 35 feet from the edge of drainageway. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

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a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Wainiha Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water and ocean water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring. Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kauaʻi community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaiʻi has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day. Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.
Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: "Hawaii Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Laura McIntyre and State of Hawai‘i Department of Health,

We received the notice from Group 70 International regarding the Preparation of Environmental Impact Statement for Hawai‘i Dairy Farms, LLC. We await the delivery of the Environmental Impact Statement with keen interest in reading its contents. We are vacation rental condo owners at Regency 512 in Poipu Kai and are concerned about the impact the dairy farm may have on the enjoyment and value of our property, and on the environmental well-being of Kauai in general.

Sincerely,

Gayle Jorgens and Stanley Wai
Regency 512
1831 Poipu Road
Koloa, HI 96756
May 26, 2016

Dear Jorgens, Gayle and Wai, Stanley:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. Ongoing dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to ongoing dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $60,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons ($6,219,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($78,000 total versus $60,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OBEQ website at the following URL: http://tinyurl.com/OBEQKAUI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeff Overton
Group 70 International, Inc.
925 Bethal Street, Fifth Floor
Honolulu, Hawaii 96813

To Whom It May Concern:

This letter is being written to identify the issues which need to be addressed in the Hawaii Dairy Farms EIS related to the New Zealand Method Dairy Farm project to be established on Kauai’s south shore at Maha‘ulepu.

1. Procure an impartial party to conduct the EIS.
2. Assess the current levels of pollution in the soil, stream and ocean at Maha‘ulepu.
3. Integrate the conclusions of the existing soil and water quality studies that have been done in the area.
4. Include the projected herd size into the EIS.
5. Address the lethality of the proposed effluent ponds.
6. Address the stench that will permeate the surrounding residential and tourist area and decimate our local tourism economy resulting in lost jobs and access to our pristine beaches in the area.
7. State the cumulative effects on the environment.

Thank you for the opportunity to voice my deep concerns related to developing this dairy farm at Maha‘ulepu.

Please notify me of everything that happens on this issue in the future phases of the EIS.

Sincerely,

David Judd
4460 Ikena Place # 37
Kailua, HI 96741
Dear David Judd:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawaii. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

GROUP 70 OBJECTIVITY: Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai’i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawaii Revised Statutes and the “Environmental Impact Statement Rules” (Chapter 200 of Title 11, Hawaii Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State and Federal agency. On numerous past EIS projects, the Hawaii Chapter of the American Planning Association has recognized Group 70’s professional work with Chapter awards for excellence in environmental planning. Part of the EIS scoping process involves Group 70’s experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai’i Dairy Farms EIS with the level of analysis required to properly evaluate and forecast the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

DAIRY OPERATIONS: Hawai’i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā'uolepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients within the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.
The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted across the Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā’ulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs,” mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximize grass as the cows’ primary nutrition source and minimize stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for Hawaii is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā’ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kauai to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā’ulepū site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and enhance the beef market in Hawai’i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as BST or BGH.

SODIS: Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during drier periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawai’i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.
Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices order identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kauai Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soils Resource Report for Island of Kauai, Hawaii.” The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalihi Clay at 32 percent, Kaua’i Brown Clay at 29 percent, and Laualaulae Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, was used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas “drainage” refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential for impacts on waterbodies.

In this way, “poorly drained” soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than “well drained” soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to absorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawaii’s soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing season. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai’i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plach Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kauai’s, and 8 on Oahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kauai’s.

The HDF project would contribute to diversification of Kauai’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawaii’i Island), approximately 10 percent of Hawaii’i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kauai’s, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to ongoing dairy operations would be created on O’ahu.
HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For ongoing operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and alluvial surface water resources in the area, and evaluated the potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.14, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimānalo volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Mānāleʻē Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black alluvial clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Mānāleʻē Valley and the HDF site ranges from 105 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipu region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Mānāleʻē may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Mānāleʻē 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Mānāleʻē 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Mānāleʻē Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no
animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po‘ipu region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipu - Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawahi Canoe Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of Enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and it is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected...
which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act
Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST
Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.
Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM2.5 is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas.

and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: search "Hawaii Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
We attended the HDF meeting for EIS, aka “dog and pony show”
in Koloa town, held only 3 days prior to the deadline for comments.
It felt more like “snake oil” salesmen, attempting to sell their magic Elixir (milk) at a traveling circus!

More troubling was what I witnessed; The station presenters, repeatedly instruct their “scribes” as to WHAT to write, transforming many comments and concerns into watered-down questions.

For example:
I asked “Why is Water not considered or included In the Cultural Impact Statement (CIS) / Cultural Impact Assessment (CIA)?”
The scribe wrote “Is water included in the CIS?”
The latter requires a simple No for an answer.
I observed this occur more than once.

Also, I QUESTIONED ALL OF THE STATIONS, of which there were four: Water, Air , Cultural and Waste management.
A bit puzzling, as there many other triggers for an EIS, as in ENDANGERED SPECIES CONCERNS,
or PUBLIC HEALTH CONCERNS. Neither had a presenter to address these important issues.

I therefore believe and request that another unbiased EIS evaluator act in the capacity of consultant, not Group 70.

I brought up SUB-SURFACE CONSIDERATIONS, as related to AIS, CIS/CIA, Water and Waste management.

Also, we informed the Oahu presenters of the incredible WINDS we have here on the southshore, the air is bad enough from VOG.

And what about the COWS in the event of a Tsunami? We have evacuated three times in the past three years, there is not an emergency plan is HDF proposal.

Participants were also encouraged to LEAVE the Comment sheet provided.
Will these REALLY be addressed in the EIS, or just published, written down on paper, as THEY STATED?

As for the proposed Dairy, we have many concerns that need to be addressed in the EIS.
Please be advised we have filed a report with DLNR, Aha Moku Advisory Committee, of which Billy Kaohelaulu'i is the KONA MOKU for Manokalanipo (Kaua'i), Document attached, dated 12/08/2014.

PLEASE consider this information, as it has been currently filed with SHPD.
Maha’ulepu is a SACRED SITE, and must be protected for future generations.

Appropriate, sustainable farming is what the IAL designated lands were meant to provide in Maha’ulepu Valley, not an inappropriate INDUSTRIAL venture. The unique soil type (grey Hydromorphic with high clay component) is perfect for Kalo (Taro).
Other appropriate crops would also fare well in this valley.

AND THEN THERE IS THE WATER;
THREE wells that provide our drinking water for our community, uncomfortably near their proposed location.
HDF cannot guarantee these wells will not be contaminated, or what they will do if they are contaminated.
The close proximity to our beautiful undeveloped beach is also at great risk of contamination, as well as the entire FRAGILE REEF ECOSYSTEM.
There is already evidence of contaminated Waiopili spring and in the Maha’ulepu /Gillian’s Beach ocean area (Blue Water Task Force/ Surfrider Kaua’i).
THIS MUST BE ADDRESSED IN THE EIS.
Please find the dairy another location, preferably in another STATE.

Sincerely,

Billy Kaohela`uli (Kona Moku, Manokala`ipo)

and

Terrie Hayes
2249 Kau Rd.
Koloa, Hi. 96756

Hard copy to follow.
4. If applicable, describe the steps (if any) taken so far to try to resolve the issue:

5. Describe any practice in use presently that is consistent with (a) maintaining the health of the area affected and (b) maintaining established indigenous Hawaiian customs:

6. Have there been any other efforts to resolve the issues discussed above?

7. Are there any residents of the identified area who have opposing views, contrasting management methods, or other interests?

If possible, can you suggest a compromise or alternative solution that you are willing to consider, that can help resolve the issue in a way that satisfies both parties’ positions, in keeping with the principles of resource protection and traditional Hawaiian practices?

* The Aha Moku Advisory Council needs to know this information in order to fully assess the reported issue, determine whether or not the reported issue is consistent with our directives as an advisory council advocating traditional Hawaiian Resource management, and to help us determine our recommendations to forward to the Department of Land and Natural Resources.
May 26, 2016

Hayes, Terrie and Kaohelauli'i, Billy
2249 Kaui Road
Koloa, HI 96756
teriemhayes@gmail.com

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhūʻalepō Road
Kaua'i, Hawai'i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Hayes, Terrie and Kaohelauli'i, Billy:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

NATURAL HAZARDS: The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards. The Māhūʻalepō property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai'i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone. The Kaua'i and Ni'ihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands.
Although they occur infrequently, Kaua‘i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhūulepū region during and following the hurricanes that affected Kaua‘i in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhūulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua‘i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area; so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

**ARCHAEOLOGICAL AND CULTURAL:** The Hawaii Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising, given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic era cultural materials associated with the many Land Commission Awards in the project area were non-existent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhūulepū Ahupua‘a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully endorsed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

**FLORA AND FAUNA:** Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing plant species. The survey also investigated the presence of plants currently listed as endangered, threatened or proposed for listing under Federal or the State of Hawai‘i’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project.
Hayes, Terrie and Kaohelauli'i, Billy
May 26, 2016
Page 4 of 11

property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plant species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhā'ulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kauai may overfly the site. The endangered Hawaiian goose, nēnē was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kēōka area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include bivering construction cranes at night, using conservation fencing to protect specified areas, marking tall structures and fencing with white visibility polytype, limiting nighttime lighting, and shading any outside lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable moat trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

Hydrology: The area's hydrology is shaped by its geology. The Kēōka area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā'ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kēōka series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā'ulepū Valley and the HDF site ranges from 105 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kēōka-Poipū area is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā'ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 39,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai'i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā'ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.
The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development.

The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2030, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

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Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels (CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” [http://health.hawaii.gov/cwb].

**Long-term Operations: Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top...
of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Pō'ipū region were also calculated. Nitrogen input to the marine environment in the Pō'ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of 10,000 pounds per year, and one percent of phosphorus (totaling 900 pounds per year). Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a wind rose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a wind rose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.
Dust will be generated as cows move along soft limestone walkways that connect the pastures and feed lots and wear and tear on manure that is exposed to the atmosphere. Dust will be detected by 50% of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 0.67 miles (within one third of a mile) beyond the dairy farm boundary, and does not reach residential areas. Results for the committed herd size of 699 mature dairy cows show odors may be detectable by 50% of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1.67 miles (within one half mile) beyond the dairy farm boundary, again not reaching residential areas.

Applying the emission rates from this available literature greatly overestimates odor potential emission resulting from HDFF. Odors in the pasture, manorial grazing system will be on pasture 22 hours each day and will spend two hours – in two 1-hour sessions – in the barn for the 10- to 15-minute milking sessions. Using atmospheric dispersion modeling system (AERMOD), the emissions were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the Island of Oahu, and the total concentration was compared to the State ambient air quality standards. Odor emissions from manure fields were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor plumes (a line used to map all points having the same numerical value) were generated from the AERMOD modeling system, and published rates for manure odors for dairy heifers and cattle were used to reflect the facilities.

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Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Results for the committed herd size of 699 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching residential areas, and again with detection limited to 50 percent of the sensitive population.

Future moduli were generated for worst case meteorological conditions (low wind velocity/mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site, in periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location; actual odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.
Dearest Suzanne Kashiwaeda,

If you've ever had to provide 24/7 care to a person, you'd understand the critical need for respite to get away from the physical and emotional responsibilities, to recharge and renew your energy and spirit to continue to care for loved ones. Mahaulepu is a place many of us go for solitude, solace and spiritual renewal.

Taking a holistic and longterm perspective, my concerns are many:

- A large industrialized dairy operation of 2000 cows would alter the quiet, peaceful and pleasant ambience of Mahaulepu.
- Runoff and pollution of nearby wells, aquifer, ocean impact on reefs, coral, fish, other marine life can seriously and negatively impact both natural and economic resources.
- We are an island community and the time-honored Hawaiian concept of ahupua’a need to be seriously considered. TMK: (4) 2-9-003: 001 portion and 006 portion (4) 2-9-001:001 portion
- If HDF follows in the footsteps of other Kauai dairies and ceases operations, what are plans for restoration of the land, pollun of ocean and health of reefs? Do roads, buildings and other infrastructure remain?
- Aren't there any other farming options for this land that would be more compatible with this area?

I understand from the meeting Group 70 held this past Thursday that individuals submitting comments will be 'consulted parties' and will receive notices, updated and pertinent information about this project. I look forward to learning more and trust that the EIS process will be thorough and objective.

Sincerely,

Suzanne Kashiwaeda
PO Box 862
Kalaheo, HI 96741
808-332-8406

May 26, 2016

Suzanne Kashiwaeda
PO Box 862
Kalaheo, HI 96741
keola@hawaiiantel.net

Subject: Hawai'i Dairy Farms Environmental Impact Statement Preparation Notice
Māhūʻulepū Road
Kauaʻi, Hawaiʻi
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Suzanne Kashiwaeda:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawaiʻi. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai'i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhūʻulepū Valley on the island of Kauaʻi to produce fresh, locally available nutritious milk for Hawaiʻi families. The rotational-grazing method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 21, 2015, described the proposed pasture-based rotational grazing system.
as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency relates to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with the draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock - grass - for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock - grass - as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, padock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3 and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected to last at least once every 45 days, to ensure that the pond is kept at manageable levels.

Cows lastate milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kauai to be raised off-site. The committed herd size of...
Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

**ARCHAEOLOGICAL AND CULTURAL:** The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising, given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic-era cultural materials associated with the many Land Commission Awards in the project area were non-existent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhā‘ulepū Ahupua‘a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully endorsed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search Hawaii‘i Dairy Farms: [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

**GROUP 70 INTERNATIONAL, INC.**

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
To: Hawaii St. Dept. of Health, Environmental Planning Office  
919 Ala Moana Blvd., Rm. 312  
Honolulu, HI 96814  

COMMENTS re EIS on Hawaii Dairy Farms proposed for Mahaulepu, Kauai  

To Whom It May Concern:  

Please tell me that this is not a “done deal.” Damage to nature cannot be healed in one’s lifetime. There is so much conflict of interest involved in this process, I can’t believe fairness can be achieved.

I think the “Head” of the Health Dept. should visit this area before making this decision.

Sincerely,  
Delano H. Kawahara

Concerned retired biology teacher – Kapaa High School, Kapaa, Kauai  
5753 Noni St., Kapaa, HI 96746-9659  
(808) 822-3271
as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency relates to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

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This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Dawn Fraser Kawahara:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**LAND USE:** The historical and existing land uses of the project site and surrounding Māhāulepū Valley were examined in the Draft Environmental Impact Statement (EIS), and uses proposed by the Hawai‘i Dairy Farms (HDF) project were evaluated in the context of county and state land use designations for the area. The evaluation of land use is presented in Draft EIS Chapter 4.4, and the project’s consistency with government plans and policies is presented in Draft EIS Chapter 5.0.

The south shore of Kaua‘i is home to some of the most productive farm land in the state, attributed to consistent sunshine, ample fresh water, and a large amount of Class A and B soils (with “A” representing the class of highest productivity soils and “E” representing the lowest). The large tracts of farmland, including those of Mahäulepū Farm and Grove Farm, allow for stability in support of farm ventures,
help maintain regional water systems and provide agricultural employment for Kaua‘i residents in addition to fresh, local food.

The project site is on agricultural land in Māhā‘ulepū Valley, an area with a long history of agricultural use as it was the first place in the island chain where sugarcane was commercially grown. The site is in the Agricultural District per State Land Use District designations, and per the County of Kaua‘i zoning ordinance. The site consists of land classified as Prime per the State Department of Agriculture’s Agricultural Lands of Importance to the State of Hawai‘i (ALISH). The HDF site is outside of the County-designated Special Management Area under the Coastal Zone Management Program.

In 2005, the State established Important Agricultural Lands (IAL) by statute. The purpose of IAL is to conserve and protect agricultural lands, promote diversified agriculture, increase agricultural self-sufficiency and assure the availability of agriculturally suitable lands. The designation process determines land meets physical requirements including contiguous, functional land units large enough to allow flexibility in agricultural production near appropriate infrastructure and water, with high quality soil agricultural productivity ratings under the Land Study Bureau of University of Hawai‘i.

In 2011, Mahanaele Farm LLC filed a petition with the State of Hawai‘i Land Use Commission to designate 1,533 acres of agricultural land in Māhā‘ulepū (including 557 acres that make up the HDF site) as IAL. IAL designation meets the objectives of the State HRS §205-42 by contributing to the maintenance of a strategic agricultural land resource base to support a diversity of agricultural activities and opportunities that expand agricultural income and job opportunities. See Figure 4.4-2 in DEIS Section 4.4.

The designation process determined that the land meets a number of physical requirements established in HRS §205-45, including contiguous, functional land units large enough to allow flexibility in agricultural production near appropriate infrastructure and water, with 88.5 percent of the area featuring an overall soil agricultural productivity rating of “B” per criteria established by the Land Study Bureau of University of Hawai‘i.

The development and long-term operation of HDF will be in full compliance with its agricultural State Land Use District designation, ALISH classifications, and County zoning. The dairy farm will embody the intent of the IAL designation per the Hawai‘i State Constitution, by using these protected lands for the intended purpose of diversified agriculture, food production and agricultural self-sufficiency. HDF development of a dairy also supports the “secondary intent” for lands in the Agriculture land designation, to provide an opportunity for Kaua‘i citizens to reside in an agricultural community. This is in contrast to the described “agricultural subdivisions” that have changed parts of Kaua‘i intended for a rural landscape, with development as quasi-suburban landscapes dotted with residences on large lots.

Overall, the project provides long-term benefit and support of agricultural lands and industry through continued use in keeping with zoning and IAL designation. Long-

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Planch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, masons, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 23 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the
committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**Alternatives:** As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include: Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios.

Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements:

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand. However, this alternative would not reduce reliance on costly imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2) and would not secure a dairy location that meets the purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawaii Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kīlauea–Poʻipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifier in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kīlauea F well, will result in no adverse impacts to ongoing use of as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kīlauea series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.
Groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhūʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kīloa Fowell in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua'i community.

Regional Water Demand: The adjacent, developed Kōlā-Poipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōlā - Poipū - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhūʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhūʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhūʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhūʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment log around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the Department of Health Clean Water Branch, dairy neighbors and the local Kaua'i community. According to the public citing the high levels of enterococci in Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhūʻulepū Valley. The State Department of Economic Development and Tourism (DBEDT) projects the Waiopili Ditch Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads. HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of the drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to...
create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 35 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,250 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the

Waipio Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occur rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai‘i Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
February 21, 2015

State of Hawaii – Department of Health
Laura McIntyre, Environmental Planning Office
919 Ala Moana Blvd., Room 312
Honolulu, HI 96814

Re: Hawaii Dairy Farms, Kauai

Comments to be considered in preparation of an Environmental Impact statement for:
Project Name: Hawaii Dairy Farms
Island: Kauai
District: Poipu
TMK: (4) 2-9-003:001 (portion); 006 (portion)
(4) 2-9-001:001 (portion)

Aloha Ms. McIntyre:
After carefully reviewing the plan for the Hawaii Dairy Farm (HDF) provided to the public for comments to be considered in drafting the Environmental Impact Statement I would assert that HDF has caused serious environmental impacts during their grubbing and grading process prior to the arrival of cows and that upon arrival of the cows the impacts would be significant. HDF will not be able to mitigate the cumulative impacts HDF will have on the environment, public health and local businesses.

First and foremost HDF must prove that there will never be discharge of pollutants from direct surface runoff or ditch discharge into Waipili stream, and that percolation into both shallow and deep groundwater will not contaminate streams, estuaries, and near shore coastal waters. It would appear there are multiple areas and weather events that could cause possible breaches. Please identify all possible areas and weather events that could cause breaches.

On the third page of the EISPN HDF uses the words “Grass-fed dairy”. What are the USDA requirements for a dairy to call itself “grass-fed”?
Why does HDF represent themselves to our community as being “grass-fed”? Does HDF meet the USDA standards to be called “grass-fed”?

How are the barns referred to in the EISPN going to be used?
Please define and be specific as to what “several years” to establish the herd means.

What range do the nutrient readings need to be in to determine that it is not wise to bring another cow onto the site? What percentage of the paddocks will need to be in the correct range of the nutrient analysis to bring more cows? What percentage of the paddocks need to be in the detrimental range to halt the addition of cows? How often will the nutrient analysis be done on all of the paddocks? What will HDF do with their cows if the nutrient analysis doesn’t support the number of cows they have?

What about the herd’s health, why isn’t that being used to determine if HDF has too many cows? For the health of the cows becomes a limiting factor, what are the standards and parameters HDF will use? (number of downer cows?)

How is HDF’s plan any better than the NZ Model when it comes to the degradation of the water, air, and the environment? Please incorporate into the EIS the common breaches occurring in New Zealand on properties abutting or containing waterways so we can examine them in direct comparison to the HDF plan’s impact.

How does the site being in the Flood Zone X impact the environment when looking at the weather hazards (hurricanes, tropical depressions and storms, etc.) that have occurred on our small island? If the soils are “supportive of nutritious grass types” as stated in the EISPN then why did the grass planted last spring fail to thrive?

What leads HDF to believe Grove Farms can supply them with 3 million gallons of water per day that they require to operate, when Grove Farms is not a utility company? The water belongs to the people of Hawaii under the state constitution (Public Trust Doctrine) have you asked the people if they want 3 million gallons of water per day diverted to HDF?

What will HDF do to get 3 million gallons of water per day when, as in Maui, the water is returned to its natural course?

What size bond is HDF putting up for cleanup when a natural disaster occurs? If there is no bond what is the rationale behind that when anyone that lives here knows it’s a matter of when not if?

What will be done to protect the cows during flash floods, tropical storms, tsunamis and hurricanes? What will be done to protect the cows from the extreme heat (over 90 degrees and up to 104 degrees per pg. 59 of HDF waste management plan) of the valley as there are no trees for them, only Norfolk pine trees to line the entry road?

The Waipili stream originates from the HDF site via springs, ground water and, mountain runoff and goes to the ocean. It has the highest bacteria count of any stream on Kauai. The ocean has high reading in front of Gillian House where the stream is polluting the ocean. Older
readings by the Department of Health show that 2008 and 2010 readings for this area were in acceptable range. What steps has HDF taken to prevent soil from being washed into the stream during grubbing and grading? How will HDF clean up the stream before bringing cows? What is HDF’s expected total cost for all improvements? How much are the tax credits valued at for these improvements because of IAL designation of the property?

Where did you get your computations and information on the distances to populated areas? The Gillin house in much much closer as well as the Hyatt Resort and all of Poipu Kai homes and condos and Poipu Aina development of home sites and existing homes are less of a distance than Koloa town. What are the distances to the aforementioned properties from the closest corner of the HDF site not the effluent ponds? Please measure again these distances. Please cite where you found the information that there were concerned citizens over the loss of Ag land that wanted Grove Farms site (HDF site) protected under IAL?

HDF states the quality of the land was studied during the designation process and was determined to be high quality soil? How is that? Where is this study, who did the study and what are their qualifications? Why does that statement contradict 2014 NRCS soils report? The EISPAN states the most abundant soils are Kalihi and Ka`ena, brown variant, which the 2014 NRCS study states those soils have a very slow infiltration rate (high runoff potential), how can this be considered high quality soil?

If an invasive species is already on the island of Kauai, explain your thought process that more is better or alright to establish in respect to Kikuyu grass. How will the wetlands be protected from the invasive Kikuyu grass? The EISPAN states Kikuyu grasses are to be used. One is a matting grass and the other a clumping grass, how are they not going to compete with one another? Kikuyu grass is toxic to cows if they eat it down past a certain point, how is HDF going to monitor the grass so the cows are sickened? Who are your horticultural experts and what are they saying in regards to the attempts that have been made to grow Kikuyu? Where are their reports as it would appear even to a layperson that the Kikuyu is suffering from failure to thrive?

The EISPAN states that DOH regulates waste management utilizing EPA’s requirements. What are these requirements and how does HDF’s plan meet or fall short on these requirements? The EISPAN states that in September and October 2014 a waste management plan was reviewed by the DOH. Was the waste management plan approved by DOH? If so please furnish the paperwork stating approval of the waste management plan. Doesn’t the DOH refer to a dairy of 699 cows as a medium size CAFO? Isn’t HDF a medium size CAFO?

Aren’t the cow walkways sloped so water will runoff and not destroy the integrity of the walkway? What is the distance from the edge of the walkway to the closest edge of the reopened drainage ditches that are connected to the Waipili Stream? Will the manure and urine from the cows twice a day trek to the milking barn be cleaned up off the walkways that are sloped towards the reopened ditches? What precautions were taken during grubbing and grading to protect the ditches from soil runoff? What was done to protect the receiving waters of the Waipili Stream and ocean during the cleaning out and reopening of the ditches from soil erosion? Are the future plans for maintenance of the ditches the same as during grubbing and grading?

What will be done with the milk in the storage tank should the milk’s temperature reach above 45 degrees? How will this affect the ditches, the stream and the ocean? How many gallons of milk would this be if the storage tanks are completely filled? Before HDF gets approved for their operating permit from DOH won’t they need to get approval from DNLR?

Has HDF considered eliminating the settling pond and instead first removing all of the particulate from the wash down water, using a passive or automated incline screen followed by a continuous sand filter, like a Dymasand? If so why did you not explore this option as by using this process you would have a higher quality effluent to hold in the irrigation pond, making a flooding event considerably less damaging to the environment? For what reason would you not use a system that the solid waste would be dewatered at the source and easily used for composting or waste-to-energy? If this system was used with aeration of the pond then the odor would be minimized. Why would you not be a good neighbor and minimize the odor through this process? HDF talks about covering the effluent ponds when speaking with the community, why not commit?

Who is the veterinarian for the cows? How often will he be checking the entire herd for health related issues, which are multiplied by the number of cows in close proximity to each other and standing in their own and other cows’ manure that is left on the ground in the paddocks?
If you chose the CAFO alternative and used the Dynasand method then less water would be needed. Why not use less water? Why not consider using smaller multiple sites for your cows, when considering alternatives, this would be more environmentally sound? Is it all about the money or is the environment worth spending more money to protect it? What large land owners besides Grove Farms in the Hawaiian Islands have you contacted and taken a serious look at the feasibility of their sites? Would any of them be more protective of the environment? How many of the sites be more protective of the environment? If the sites were more protective, what was the rationale behind rejecting the sites? Do you believe the Important Agricultural Land designation with all its tax benefits was intended to help small farmers succeed and not for large profitable corporations? HDF states in the EISP that initial operations are permitted to begin with up to 699 cows. Where is the operating permit? Could you make a copy available to the community? What access will the community be allowed to the cultural sites? How are these sites to be protected from the effects of acid rain that is produced when hydrogen sulfide produced by the cows meets with rain? How often does the temperature in the valley exceed 86 degrees? What are the highest of the temperatures that exceed 86 degrees? How will the cows be protected during this extreme heat? How many times has the rainfall exceeded 50" per annum? When was the longest and most extended rainfall event recorded on Kauai? What major events happened during this time? How would this effect soil erosion in the valley? Where will the cows go during such events? How will they be protected? The EISP states no known seismic activity has originated among these northern islands then why does the earthquake map from USGS, Atlas of Natural Hazards in the Hawaiian Coastal Zone show one on their map in Maha'ulepu area? There are new flood maps, what was the date of the flood map that was cited in the EISP? The EISP states that during hurricanes, operational plans for safekeeping of the dairy's livestock will be identified in the Draft EIS. What about the enormous quantity of manure on the ground, how will that be protected from leaving the dairy during a hurricane that comes with torrential rains?

The EISP states the average annual rainfall in Maha'ulepu is 50" why is this figure so different than the 60" to 100" mean annual precipitation cited in the 2014 NRCS Snail report? The change in number of inches of rain due to climate change needs to be accounted for in the EIS draft. How far away is Koloa drinking water well F from the proposed desludge site, block H at its closest point? What is the ability of the soil to transport water/liquids in Block H? How long would it take for the liquids from the desludge to migrate through this type of soil after a rain storm? What are the readings from the baseline air quality test? If HDF hasn't done a current air quality study before any cows come, why not? What are the noise readings from HDF baseline study? If HDF hasn't done a baseline study, why not? How many decimals is the bawling of a new mother cow when separated from her calf? How many decimals higher in terms of human hearing is the bawling at night when ambient sounds disappear? Based on HDF's plan approximately 333 cows will be separated from their new born calves every two months. What is the decimal reading of 333 cows bawling after being separated from their calves? How many days on average do mother cows bawl for their calves and how many hours per day on those days? What is the EPA permissible noise level in a populated community? How does the EPA level compare to the noise level of cows bawling? Will HDF have an air monitoring system on location? What type of system? How is it calibrated for accuracy? Who will be responsible for recording the readings and alerting the community and officials when it surpasses Hawaii's or EPA standards, will it be an unbiased person or an HDF employee? How often will the reading be reported to the community so as to alert community members with respiratory problems? What are the readings on the six pollutants for air quality established by EPA (NAAGs) that should not be exceeded? What will HDF do to resolve the problem of poor air quality if it should occur for each of the six pollutants? How will the farm workers be protected from air pollutants seeing as they would get the brunt of the pollution? What kind of health insurance will be provided for the workers? In regards to your irrigation system. What is the dimensions of the 2 pivots circles- radius etc.? How many wheel assemblies are there and what is the tonnage load per wheel section both empty and full? How are the certain ruts treated? What is the total mileage of the
individual wheel section tracks? What are the specs re: slope climbing ability of the HDF pivot system? Where is it emptied out when transitioning between effluent spreading and irrigation use? What is the uniformity/spread certainty, error rate distance of the end gun system that HDF proposes? Rutting is a common problem with wheels/booms getting stuck. Will this create an over application of effluent? How is HDF going to deal with wheel rutting problems causing new ditches in which the water/effluent can flow into the stream?

The plan states that discharging "hydrants which have a "gun sprinkler" with a 5/8 inch nozzle attached via a length of flexible hose", does this meet code?

What is the exact amount of water usage per dairy cow per pre-milking wash down?

The plan that West Kauai Soil and Water Conservation approved in 2013 is no longer as that plan was unacceptable to DOH and a complete new plan (July 2014) has been adopted by HDF. When is HDF going to submit the new plan for approval to the West Kauai Soil and Water Conservation?

What is the depth to Water Table for the soil (KavC) pod 159 of the burial pits? Are you planning on leaving 2 feet of soil above the water table before HDF buries a cow? Are you planning on spacing the dead cows 2 feet apart horizontally? HDF’s archaeologist said at the Feb 19th, 2014 meeting that the water table was at 3.5 feet deep. If you need to leave 2 feet above the water table that would only leave 18 inches. How wide are dead cows? What are your calculations on how many dead cows you can bury in your cemetery? Where is HDI going to put them after the cemetery is full? Will the cemetery seep deteriorated matter to the nearby wetland on the property next door? What steps will be taken to stop possible seepage? Should there be seepage how would this impact the endangered water birds? How is HDF going to stop the large rain runoff from coming down the mountain and floating up the dead cows?

Where is the large depression referred to in the Kaua’i Reconnaissance Survey? What is being done to protect it?

How will the Makauwahi cave that floods every couple of years, be protected from contaminated runoff from the HDF site? This contamination would include manure, urine, fertilizers, antibiotics, hormones and phosphorous and nitrates.

How is HDF going to protect the community from being bit by the biting flies while trying to enjoy the beach? How is HDF going to protect the community at large from biting flies? Will HDF be responsible for all medical bills, pain and suffering inflicted by the biting flies as a vector for disease?

Have you studied the diseases caused by flies as a vector? Why not? Are you going to make the study available to the community at large?

What is HDF going to do to protect the wetlands and nesting environments from becoming inundated with the invasive kikuyu grass causing the endangered species loss of their forage?

What will be done to protect the waterbirds, the Newell Shearwater, the migratory birds, the indigenous species, the terrestrial Invertebrates, the marine vertebrates, the reef fish, the arthropods and the seaweed that the local people gather? Please address these individually citing their habitat needs and how those are being protected? What will be done in the event of a breach to insure that these species are not desecrated?

The social-economic impacts will be greatly significant. How much will house values drop within 5 miles of the dairy? Please denote these figures for every half mile increment. How far can flies travel? Once a fly reaches another moist area, how far will it fly from there? How many larvae does each fly lay? What is the exponential number of flies after a year of the dairy opening if we start with one fly per cow (2,000 flies)? How will this affect homes with pools value within 5 miles of the dairy? How far will the odor travel based on an average day’s northeasterly or easterly wind speed of between 15-17mph? How will HDF protect the community including Keiki and Kapuna from the gases and particulate produced in the air by the dairy? What about the community members that have compromised lungs? Will HDF pay for their medical expenses if their conditions take a turn for the worst after the dairy is in? Many dairies purchase the homes that are impacted by their operations, how many will HDF purchase?

The EIS must study the impacts to the environment and study the potential Impacts to the Poipu visitor economy which will be significantly impacted by the environmental consequences of such an intensive land use in the Maha’ulepu valley. How many jobs would be lost at the Hyatt because of odor and flies? Does HDF plan on remunerating the Hyatt for lost business? What about the owners at Poipu Kai and other vacation rentals loss income? What will HDF do to address the impact of acid rain created by the off gassing of their cows?
Will HDF be saying the county to accept their solid waste? What is the county’s cost per ton for their HDF? How much will HDF pay per ton?

The EISPN states that the site has a system of ditches to channel storm water through the area, as well as to drain fields. Are these the same fields where the manure and urine are left on the ground? Would this not be considered nonpoint source discharge? Wikipedia defines nonpoint source discharge as, “Nonpoint source (NPS) pollution refers to both water and air pollution from diffuse sources. Nonpoint source water pollution affects a water body from sources such as polluted runoff from agricultural areas draining into a river, or wind-borne debris blowing out to sea.”

Specifically how is HDF’s operation any different than as defined nonpoint source discharge?

I hereby incorporate all of the questions and/or concerns voiced by the community at the Feb 19, 2014 meeting at Koloa Cafeteria that HDF and Group 70 put on for the community.

Please respond to the above questions in your draft EIS as they speak to several of my concerns over Hawaii Dairy Farms operation and their choice of locating their dairy in an environmentally sensitive area.

I wish to be a party to this EIS and receive any and all notifications and emails.

Eileen Keelohian
1722 Keoniola Pl.
Koloa, HI 96756
backonisland@gmail.com

cc: Hawai‘i Dairy Farms, LLC.
P.O. Box 1690
Koloa, Hawai‘i 96756-1690

Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, HI 96813
Jeff Overton, Principal Planner
May 26, 2016

Eileen Kechloian
1722 Koonoa Place
Koloa, HI 96756
backonisland@gmail.com

Subject: Hawai'i Dairy Farms Environmental Impact Statement Preparation Notice

May 26, 2016

Dear Eileen Kechloian:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai’i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP/N. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at six sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 95 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestive cycle. The animals are managed in social groups known as “mob”, mimicking the natural social order of bovines. Cows spend 12 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways...
The health of the herd is of primary importance as the success of a dairy relies on cows being healthy and productive. This will be achieved by a nutritionally balanced diet, the management practices and pasture model applied by HDF. Grass is the primary source of nutrition for the cows, and the management system applied by HDF maximizes grass as the cows' primary nutrition source and minimizes stress to the animals. Cows are healthier and live longer, productive lives with access to fresh air, high quality feed, and a comfortable path under hoof. The pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as birthing/mature dairy cows. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

The climate conditions. Climatic conditions affect the growth of forage and the health of dairy cows. Heat stress can reduce the productivity of dairy cows, and suitable climate conditions, as occasional storms can generate strong Kona winds from the southeast. Changes to solar radiation and the hydrologic cycle large enough to affect climate conditions, as occasional storms can generate strong Kona winds from the southeast. Changes to solar radiation and the hydrologic cycle large enough to affect climate conditions, as occasional storms can generate strong Kona winds from the southeast. Changes to solar radiation and the hydrologic cycle large enough to affect climate conditions, as occasional storms can generate strong Kona winds from the southeast. Changes to solar radiation and the hydrologic cycle large enough to affect climate conditions, as occasional storms can generate strong Kona winds from the southeast.

Rain gauge data for a rain gauge located near the site of the main highway was used to develop a weekly rainfall event-frequency for the site. Rainfall events for 30 years were recorded (a total of 10,357 days from 1948 to 2013), and ranked based on the days of consecutive rainfall (DPR) and the corresponding rainfall amount. The data used was from 1974 to 2013 for the period of record. The data used was from 1974 to 2013 for the period of record.

The ef fluent storage ponds are sized to accommodate 30 days of storage for up to 200 milk cows. The storage pond is located at the site of the effluent storage pond. The storage pond is located at the site of the effluent storage pond.

Every 45 days, to ensure that the ponds are kept at manageable levels. The timing of the application of irrigation water is crucial. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The timing of the application of irrigation water will be determined by the desired use of the irrigation water. Irrigation water is applied to the pastures at the right time, to ensure that the pastures are properly used and irrigated with nutrient balance.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, time, and placement of nutrients applied to land. The timing and application of nutrients are critical for nutrient management. The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, time, and placement of nutrients applied to land. The timing and application of nutrients are critical for nutrient management. The timing and application of nutrients are critical for nutrient management. The timing and application of nutrients are critical for nutrient management. The timing and application of nutrients are critical for nutrient management.

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processes. The 557-acre site is not large enough to have a regional influence on climate.

Annual rainfall, prevailing winds, and solar radiation conditions at the HDF site are well suited to growing dairy pasture grass and conducting pasture-based dairy operations. Neither the committed herd size of 699 mature dairy cows nor the contemplated herd size of up to 2,000 mature dairy cows will affect climate conditions over the short-term or long-term. No significant impacts are anticipated, and no mitigation would be required.

**SOILS:** Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during dryer periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawaii at Manoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

Soil conservation is a core principle behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kauai Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a "Custom Soils Resource Report for Island of Kauai, Hawaii." The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soil classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalahi Clay at 32 percent, Ka‘ena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as "poorly drained," and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen, phosphorus, calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas "drainage" refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrate and nitrite gases to gaseous forms, which reduces the potential for impacts on waterbodies.

In this way, "poorly drained" soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than "well drained" soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawaii’s soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

**NATURAL HAZARDS:** The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhāulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai‘i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside
the tsunami evacuation zone. The Kaua‘i and Niihau region of the Hawaiian Islands
has experienced tremors from earthquakes originating further south in the island
chain, but no known seismic activity has originated among these northern islands.

Although they occur infrequently, Kaua‘i has received a greater amount of damage
from hurricanes when compared to the other Hawaiian Islands. Land management
personnel in the Māhā‘ulepū region during and following the hurricanes that
affected Kaua‘i in 1962 and 1992 observed defoliation of vegetation, and no flooding
events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy
facilities will meet International Building Code (IBC) 2006 standards with local
amendments. Provisions in design will address wind loading (including hurricane
gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of
the area recommended Seismic Site Class D under IBC standards be utilized for
foundation design where the barns and agricultural infrastructure will be
constructed.

There has been no rainfall event that would exceed the capacity of the effluent
ponds since rainfall has been recorded in Māhā‘ulepū Valley. The effluent pond
capacity has been designed above the regulatory requirement to contain the 25-
year, 24-hour rainfall event. An emergency containment berm with additional
capacity for another 30 days is included in the design. This design exceeds
regulatory requirements, with containment in excess of the major rainfall events
recorded on Kaua‘i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for
HDF internal use that addresses hurricane, fire, and potential flooding hazard
scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned
for in the disaster plan. The disaster plan relies upon knowledge of cow behavior,
and is based on extensive guidance for livestock protection from NRCS, the Florida
State Agricultural Response Team (SART), Pennsylvania State College of Agricultural
Sciences, and Cornell University Cooperative Extension. The plan includes safety
procedures during any disaster, follow up actions, and emergency contacts for
assistance before, during or following the event. Further information is provided in
the Draft EIS Section 4.6.2.

ARCHAEOLOGICAL AND CULTURAL: The Hawai‘i Dairy Farms (HDF) project is
subject to a historic preservation review by the State Department of Land and
Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter
6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural
Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for
the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology
and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of
the project area and an extended survey area of 100 meters of the northern
boundary. Six historic-era sites occur in the project area and 10 sites occur in the
extended survey area. Only one of the sites is believed to be associated with pre-

Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau,
and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of
the project area. The remaining sites consist of historic-era bridges, ditches, culverts,
retaining walls, and a flame system dating from the 20th century and are affiliated
with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not
surprising given the massive landscape modifications that occurred during intensive
sugarcane cultivation on the valley floor. Even historic era cultural materials
associated with the many Land Commission Awards in the project area were non-
existent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the
archaeological consultant and the dairy project is anticipated to have no impact on
these sites. No further archaeological work is recommended for the sites. Two of the
sixteen sites are considered significant under multiple criteria, but occur outside the
project area on lands owned by a different landowner. Both sites will not be adversely
affected by the proposed dairy project. No site is related to burials, and no bones
were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural
resources, practices or beliefs, its potential to isolate cultural resources, practices or
beliefs from their setting, and the potential of the project to introduce elements
which may alter the setting in which cultural practices take place. Information
received from the community indicates the Māhā‘ulepū Ahupua‘a, has been and is
currently used for traditional cultural purposes. However, the dairy project area has
not been included in these activities. It is clear that the gathered plants, trails, State
Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved
petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the
leased premises, which will ensure that project activities and any related impacts
are contained within the project area. Based on the research and comments received
from the community, it is reasonable to conclude that, pursuant to Act 50, the
exercise of native Hawaiian rights or any ethnic group related to numerous
traditional cultural practices will not be impacted by establishment of the dairy.

FLORA AND FAUNA: Botanical, avian, and mammalian surveys of the property were
done by AECONS Consulting to assess existing species on site, including identifying
any species listed as endangered, threatened, or proposed under any state or federal
endangered species programs in or near the property. EIS Sections 4.9 and 4.10 evaluate the address of flora and fauna
resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECONS
Consulting to assess existing plant species. The survey also investigated the
presence of plants currently listed as endangered, threatened or proposed for listing
under Federal or the State of Hawai‘i’s endangered species programs, located onsite
or within the immediate vicinity of the dairy site. The nature of the land and its
present and historical uses for intensive agriculture very much limit the natural
invertebrate species were noted in the survey of the site. In particular, the greenbottle fly is
often confused with the house fly. Risks known to exist on Kauai and in the greenbottle fly are
inherent to the dairy and utilize manure as a food source. HIPI will prevent and control practices. A full list of site-specific measures is provided in ES
Section 4.1.4. The project location does not allow any habitat for drosophilids
in the high elevation koa woods.

Fly populations of HIPI will be monitored through pasture management practices. A point
management plan is used (PI M). Dung beetles are specialists in the very important natural process of
breaking up and quickly recycling bovine manure pads. The behavioral diversity
among dung beetle species will work together to bury dung pats in one to three
days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

Mammals were encountered on the property. It is probable that some nest on or adjacent to the site as this species nests
to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web
among species.

The principal potential impacts posed to the five endangered species include those
potentially associated with construction activities, and those associated with dairy
operations following build-out. Measures will be adapted to avoid potential
mitigation strategies will be implemented for drosophilid species. The

Appendix A lists the threatened and endangered species and potential impacts. The survey
covers the dairy site area and immediate vicinity. Common birds and terrestrial
mammals were encountered on the property. There is no critical habitat for

Four species of endangered waterbirds were recorded on the site and at the nearby
roosting site located within the HDF site. Though the area does not provide critical
habitat, seabirds that nest in upland areas of Kauai may overfly the site. The
behavioral diversity among drosophilid species will work together to bury dung pats in one to three
days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis.
While caution will be taken during any potential disturbance or vegetation removal,
mitigation measures are further
described in DBES Section 4.1.2.

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mitigation measures are further
described in DBES Section 4.1.2.
dairy farm and planned mitigation actions. Draft EIS Section 4.12 addresses noise conditions.

Noise can be defined as unwanted sound, a sound that is considered loud or unpleasant, and/or sound that causes disturbance. Research related to noise and livestock focuses on noise levels and minimization of unexpected sounds that cause undue stress on cows. Noise stress results in loss of livestock productivity and thereby financial loss to farmers and ranchers. Little research exists on the sound levels from livestock.

Sound is measured in decibels (dB). The State of Hawai'i Department of Health (DOH) rules use the A-weighting sound network (dBA) in the HAR §11-46, Community Noise Control. Sound through the air is similar to ripples on a pond of water. In open space without reflection, ripples spread uniformly in all directions and decrease in amplitude further from the source. In free field conditions such as outdoors, amplitude drops by half as distance doubles (OSHA, 2016). When sound passes close to absorbing ground cover such as grassland and fields, the "soft ground" absorbs extra sound as it passes. The Hawai'i Dairy Farms (HDF) site in Māhō'ulepū Valley is approximately 2 miles from the resort area, and 1.5 miles from the closest residential areas (on land zoned for agriculture). Typical noise currently generated near the HDF site includes truck ingress/egress along private farm roads, agricultural equipment, and cattle and sheep.

Construction work at the project site will involve activities that may generate an increase in noise levels. However, such exposures will be a short-term condition, occurring during daylight hours. Construction vehicles and activities must comply with DOH Administrative Rules. DOH noise control regulation requires a permit for construction activities that emit noise in excess of 78 decibels or that cost a total of more than $250,000. Mitigation measures to minimize construction noise will include the use of mufflers to suppress loud equipment and limitations on the hours of heavy equipment operation.

The dairy farm will utilize milking equipment contained in the milking parlor, and will use field equipment such as tractors. Under HAR §11-46, agriculture is classified as Zoning District Class C, which specifies maximum permissible sound levels of 70 dBA in the daytime and 70 dBA at nighttime. Dairy operations will generate noise in keeping with agricultural zoning of the parcel. The primary noise receptors in the area would be farmers working nearby parcels. Noise from the dairy will not exceed the DOH threshold, and will not contribute to excessive noise in the region.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai'i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.
WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawaii Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area's hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths - as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black alluvial clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move through the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaii Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County's Kōloa well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Poipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Poipū - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface
Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘apu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococci to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococci in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels observed in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffer:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, US. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 15-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposed directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than ground water, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.
To provide perspective, nutrient inputs from the adjacent Kīloa-Pō'ipū region were calculated. Nitrogen input to the marine environment in the Pō'ipū region is calculated to be 38,510 pounds annually, or 35 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pō'ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipōlū Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH GWR, dairy neighbors and the local Kauā'i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EB sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emissions relevant to dairy operations or small businesses currently exist.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kauā'i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₂.₅ is 2.01 μg/m³ well below the State standard of 150 μg/m³. The estimated concentration for PM₁₀ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure storage ponds, and the dairy buildings. Odor rates from published research were
value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists can detect the odor.

The analysis, therefore, focuses on alternatives that meet the project purpose. Although the alternatives are not directly comparable to the proposed action, they were reviewed to assess how well they might reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include (1) the development of a Conventional Feedlot Dairy (as defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4)).

The essential differences as compared to the proposed action are highlighted in the following statements.

- ALTERNATIVES: Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai’i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feed stock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows. Alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua’i in a wide range of positions, including as agronomists, land managers, and agricultural infrastructure, water systems and support facilities. Alternative (Residential Alternative) could also demonstrate the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3).

Four possible land uses that would not meet the project purpose are discussed. The potential consequences in terms of environmental benefits, costs, and risks of each reasonable alternative are evaluated against those of the proposed action. (Criterion 1). The project’s objective is to identify and evaluate a range of reasonable alternatives against those of the proposed dairy project. Further discussion of alternatives that could not meet the objectives of the action’s purpose and need, and compare environmental benefits, costs, and risks of each reasonable alternative and the proposed action. The potential consequences of the proposed action, and environmental benefits, costs, and risks of each reasonable alternative and the proposed action are evaluated against those of the proposed action. (Criterion 1).

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compared to the proposed action and the four other alternatives. The potential consequences in terms of environmental benefits, costs, and risks of each reasonable alternative are evaluated against those of the proposed action. The potential consequences in terms of environmental benefits, costs, and risks of each reasonable alternative are evaluated against those of the proposed action. (Criterion 1).
Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai'i Dairy Farms was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai'i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai'i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua'i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawai'i Dairy Farms": http://tinyurl.com/OEQCKAUAJ

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
This environmental document is prepared pursuant to Hawai‘i Revised Statutes, Chapter 343, Environmental Impact Statement Law and Chapter 200 of Title 11, Administrative Rules, Department of Health, Environmental Impact Statement Rules.
HAWAI‘I DAIRY FARMS

DRAFT ENVIRONMENTAL IMPACT STATEMENT

VOLUME 4
COMMENTS AND RESPONSES TO THE EISPN - PART B

SUBMITTED BY:

Hawai‘i Dairy Farms
MAHA‘ULEPU, KAUAI

PREPARED BY:

GROUP 70
INTERNATIONAL

Architecture • Planning & Environmental Services • Interior Design • Civil Engineering
925 Bethel Street, 5th Floor, Honolulu, HI 96813 (808) 523-5866

This environmental document is prepared pursuant to Hawai‘i Revised Statutes, Chapter 343, Environmental Impact Statement Law and Chapter 200 of Title 11, Administrative Rules, Department of Health, Environmental Impact Statement Rules.

Jeffrey H. Overton, AICP, LEED AP

MAY 2016
## Consulted Parties

### Respondents and Distribution

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### A. Federal Agencies or Affiliates

- Environmental Protection Agency
- Department of Agriculture
- Department of Commerce
- Department of Homeland Security
- Department of Transportation
- Department of the Navy
- National Oceanic and Atmospheric Administration Fisheries
- U.S. Army Corps of Engineers, Honolulu District
- U.S. Department of the Interior Fish and Wildlife Service, Pacific Islands
- Department of Interior, Geological Survey, Pacific Islands Water Science Center
- Department of Interior National Parks Service, Pacific Islands

### B. State Agencies

- Department of Accounting and General Services
- Department of Agriculture
- Department of Business, Economic Development & Tourism (DBEDT)
- DBEDT, Office of Planning
- DBEDT, Strategic Industries Division
- Department of Hawaiian Home Lands
- Department of Land and Natural Resources (DLNR)
- DLNR, CWRM
- DLNR, Engineering Division
- DLNR, Historic Preservation Division
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The Garden Island | X |

**H. Libraries**

Department of Education
Hawai‘i State Library
Hawai‘i Documents Center
Hawai‘i Kai Regional Library
Hilo Regional Library
Kahului Regional Library
Kaimuki Regional Library
Kāne‘ohe Regional Library
Legislative Reference Bureau
Library of the Department of Business, Economic Development, and Tourism
Lihu’e Regional Library | X |
Pearl City Regional Library
University of Hawai‘i Hamilton Library
University of Hawai‘i at Hilo
Edwin H. Mo‘okini Library
University of Hawai‘i Kaua‘i Community College Library | X |
University of Hawai‘i, Maui College Library

**I. Community Interest Groups and Individuals**

Contractors Association Kaua‘i | X |
Friends of Māhā‘ulepū | X | X |
Grove Farm | X | X |
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February 21, 2015

Attn: Laura McIntyre (808) 586-4337
State of Hawaiʻi, Department of Health
1250 Punchbowl Street,
Honolulu, HI 96813

State of Hawaiʻi, Department of Health
919 Ala Moana Blvd room 312
Honolulu, HI 96814
Laura McIntyre, Environmental Planning Office

Hawaiʻi Dairy Farms, LLC.
P.O. Box 1690
Koloa, Hawaiʻi 96756-1690

Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, HI 96813
Jeff Overton, Principal Planner

Comments to be considered in preparation of an Environmental Impact statement for:
Project Name: Hawaiʻi Dairy Farms
Island: Kauaʻi
District: Poipu
TMC: (4) 2-9-003:001 (portion); 006 (portion)
(4) 2-9-001:001 (portion)

To whom it may concern,

The following is my response and comment to the Hawaii Dairy Farms EISPN, posted on January 23rd, 2015. Each of the comments below need to be included and fully addressed by the Hawaii Dairy Farm EIS due to the substantial adverse environmental impact likely to be sustained if an Industrial Dairy is allowed to operate at Mahaʻulepu on Kauaʻi:

As all wildlife has what is known as a ‘tolerance range,’ once that range is exceeded the wildlife and threatened and endangered species may leave an area or die. Those amphibians that can’t leave will die. For this reason each rare or endangered species, necessary habitat, mating behaviors, sensitivity to sound, sensitivity to methane gas, hydrogen sulfide, acid rain, and sensitivity light & glare, needs to be addressed in the EIS on an individual, per species, basis. The cumulative effect of all of these sensitivities on their survival as well as their potential inability to increase their numbers needs to be addressed. The necessary environment required to enhance the livability of our Federally threatened endangered species must be addressed in the EIS.

Specific Endangered birds

The native and endemic endangered birds known in the Mahaʻulepu area are the Hawaiian Coot (ʻalae kiʻokeʻo), Common Moorhen (ʻalaeʻula), Hawaiian Duck (Koloa), Hawaiian stilt (ʻaeʻo) and Hawaiian Goose (nene). The impacts to each of these endangered birds need to be addressed separately in the EIS as each has its own nesting habits, food sources and environmental requirements.

Wetlands and Endangered birds

The Intermittent streams and wetlands at Mahaʻulepu and Kipu Kai provide habitat for these endangered birds. The placement of a cow burial site near the edge of the HDF’s property just adjacent to, and upland from, a known wetland needs to be addressed especially in light of the hydrologic interconnection of the valley, according to the Mahaʻulepu, Island of Kauaʻi Reconnaisance Survey (completed by the National Park Service, U.S. Dept. of the interior in 2008) on page 29. The 600+ dead cows that HDF needs to dispose of per year is an environmental threat to the wetlands and the endangered birds that live or frequent there. (Dead cows tally on record at the county council meeting in May 2014.) This significant adverse impact needs to be addressed in the EIS. The specifics of the method used and the value judgments made need to be disclosed by HDF to enable proper review of significant adverse impacts that may occur. Any manure or urine left on the paddocks that are upland of wetlands needs to be addressed in the EIS because of the possibility of runoff contaminating the wetlands with total nitrogen, ammonium nitrogen, nitrate and nitrite phosphorous, Enterococcus and hormones.
Waterbirds

Along the Māhā‘ulepū watershed coastline, other small wetland ecosystems fed by rain and groundwater lie just inland of the dunes. These, too, attract native waterfowl; biologists believe they once supported larger populations, and have excellent restoration potential. Resource specialists told NPS that Māhā‘ulepū and Kīpū Kai, in combination with Hulē‘ia, provide a much-needed mosaic of varied wetland habitats that should be reliably available for endangered Hawaiian waterbirds. (MIKRS) All wetlands small and large need to be individually identified in the EIS. Protection of these wetlands or potential wetlands needs to be addressed in the EIS. The specifics of the method used and the value judgments made need to be disclosed by HDF to enable proper review of significant adverse impacts that may occur.

Taro Patch and rain event

“According to a state source, nēnē, koloa and other waterfowl frequent the taro lease land in Māhā‘ulepū valley, and a broad natural depression in the valley that fills with water after heavy rain draws many waterbirds. Sixty Koloa individuals were counted during one such event (Kaiakapu 2007).” (Page 39 MIKRS) The exact area of the “broad natural depression” needs to be determined and protected for the wild birds. The area of the depression needs to be established with the necessary fauna and flora to provide the bird’s habitat. If the depression area has been disturbed by the grubbing and grading that occurred in 2014 by HDF, it needs to be restored. The specifics of the restoration need to be spelled out in the EIS. If the depression area is still viable then the area needs to be protected for the wild birds and named in the EIS. Any potential significant adverse impacts from dairy operation such as grazing, irrigation, herd movement, etc., must be addressed in the EIS. Additionally protection measures taken must be elucidated in the EIS.

Newell’s Shearwater

Newell’s Shearwater, a threatened native bird species, and nests on Ha‘upu ridge, just above the dairy site (USFWS Recovery Plan for Newell’s Shearwater). The fledglings leave their nests on Ha‘upu ridge and fly towards the ocean directly over HDF’s facilities. “Kauai is home to 90% of the total population of Shearwaters” (The bird that Darkened Kauai” by Coco Zickos).

“Transitioning to bird-friendly lighting at all county facilities has been one of our priorities, so we’ve budgeted for the retrofits for several years,” Mayor Bernard Carvalho Jr. wrote in an email. “The new lights, Rapozo said, will be available seven days a week from 6 to 10 p.m. during ‘non-fledgling season’ — dates outside of the Shearwaters’ fledgling season, which runs from Sept. 15 to Dec. 15. The systems at each facility include a push button to turn the lights on for an hour at a time and an alert system at the end of each hour that will warn users that the button needs to be pushed again for additional use. If the button is not pressed, the lights will turn off, which could save the county money on its electricity bill” (The Garden Island January 29th, 2015).

“The upgrades were one of the steps taken by the county to comply with a 2010 Justice Department plea agreement in which the county and Kauai Island Utility Cooperative admitted to violating the Migratory Bird Treaty Act. The charges, at the time, blamed the deaths of Newell’s shearwaters on the lighting policies at county facilities. Officials said seabird fledglings can become confused by stray light during their first nocturnal flight from their nesting burrow to the sea. Some of these birds end up falling inland, where they can become prey for predators” (The Garden Island January 29th, 2015).

The Waste Management Plan for HDF submitted to the DOH states, “Rotary Milking System of 60 clusters that provides for a throughput of 360 cows every hour and allows for a maximum milking time of 6 hours approximately per milking and 12 hours per day.” To accomplish milking the herd it will take approximately 12 hours. Additional time will be needed for cleaning out the facility and directing the waste to the effluent ponds, maintenance of equipment, to convey feed from 2 large silos to disc mill, and to take processed feed from mill to 904 feed system silo then to convey the feed to the feed shed. Additional time will be needed for delivery of grains to facility and maintenance of the feed system. These and many other processes will take beyond 12 hours per day. In fact, HDF at their public meeting in Lihu‘e at KCC, on March 27th, 2014, stated that the milking would begin at 4am and go until 3am then start again at 4 pm, going until 10 pm. The issue here becomes many of these processes needing to be done at night and the lighting that would be needed. This will interfere with the migration of the shearwater fledglings to the ocean. The Migratory Bird Act comes into play here. The county stopped all games at the stadiums at night to comply. How will HDF comply when in fact there isn’t enough daylight to run their operations? This
needs to be addressed in the EIS. The specifics of the method used and the value judgments made need to be disclosed by HDF to enable proper review of significant adverse impacts that may occur.

Migratory Birds

"Four migratory bird species that winter in Hawaii and return to the Arctic to breed were noted in the study area." The Pacific Golden Plover, Ruddy Turnstone, Wandering Tattler and the Sanderling (MIKRS). There are additional migratory shorebirds that frequent the coastline occasionally, and other seabird species likely transit the coast. A State study notes that seabirds use the coastal sea cliffs and foothills for nesting and loafing (OSP 1992). The environmental requirements of these migratory birds need to be addressed in the EIS as well as the impact of the dairy’s runoff, grey water, and predatory animals attracted by the dairy operation and the waste produced. The presence of rats and egrets, known to consume bird eggs, need to be addressed. Rats are currently having a substantial impact on the bird population in Koke’e. The State is also presently addressing a major rat infestation in Lehua, the island adjacent to Niihau. Steps to protect these birds from all adverse externalities need to be addressed in the EIS.

The cattle egret may consume the young of endemic waterbirds (USFWS 2005) and compete with native waterbirds for food (Hawaii Audubon Society 2005). The number of egrets attracted by 2,000 cows needs to be addressed in the EIS. Protection of food sources for waterbirds needs to be addressed in the EIS.

Native Species

Five native species are known to frequent the area: the Black Crowned Night Heron, White Tailed Tropicbird, Great Frigate bird, Wedge Tailed Shearwater, and Red Tailed Tropicbird. The Black Crowned Night Heron finds breeding habitat at Huli’ia NWR and was spotted during the survey. Biologists describe Frigate bird sightings at Māhā’ulepū and on Mt. Hā’upu. MIKRS These birds, their special needs and what methods will ensure their survival need to elucidated in the EIS.

Terrestrial Invertebrates

Two notable and extremely rare terrestrial invertebrates live in the Māhā’ulepū area: the Kaua’i Cave Wolf Spider (Adelocosa anops) and the Kaua’i Cave Amphipod (Speleoorchestia Hanamā‘ulūna). In 2000, both the spider and the amphipod were Federally listed by USFWS as endangered species. All known populations occur in the Kōloa basin on Kaua’i, within a 4-square-mile area (CBD 2007). Both species have been reduced to a few small populations; exact numbers remain unknown. Researchers say the spider is seen regularly in only one cave with a population of 16 to 28 individuals (USFWS 2005). The cave-faced corridor along the Māhā’ulepū coast of the study area, from Makawehi Point to Kawelikoa Point, is designated by USFWS as Critical Habitat for both of these endangered species. How is HDF going to protect their Critical Habitat from a deluge of manure-laced water coming down the Waipii Stream and flooding the cave and vicinity during a rain event, tropical storm, or Hurricane? The cave floods from the rising waters of the Waipii approximately every four years. This issue needs to be thoroughly addressed especially in light of the fact that Māhā’ulepū Valley is hydrologically connected to the cave. MIKRS

The Marine Vertebrates

The beaches and near shore waters are home to three important large marine vertebrates: the endangered Hawaiian Monk Seal, known in Hawaiian as ‘Ilio holo ika uaua (Monachus schauinslandii), the endangered Humpback Whale or kohala (Megaptera novaeangliae), and the threatened Green Sea Turtle or honu (Chelonia mydas).

Successful Monk Seal pupplings occurred at Māhā’ulepū in 2000 and 2007 (MIKRS). Monk seal occurrences within the study area take on increasing significance as the overall population continues declining at about 4 percent each year. The updated Recovery Plan for the Hawaiian Monk Seal, released in August 2007, states that the species ‘is headed to extinction if urgent action is not taken.’ Its recovery strategy calls for actions to ensure continued growth of the Seal population in the main Hawaiian Islands (NOAA 2007b). Fast forward to February 2015, The Garden Island Newspaper states, ‘The Marine Conservation Institute is calling for the National Oceanic and Atmospheric Administration to redouble its efforts’ to conserve and recover the endangered Hawaiian Monk Seal. ‘Although NOAA’s field staff has made progress on some fronts to protect and save the lives of individual seals, we think NOAA can— and must— do more to slow down and eventually reverse the decline,’ MCI’s Conservation Advisor William Chandler said during a teleconference Thursday. Despite continued efforts, the population of between 900 and 1,100 seals is declining at an annual
rate of 4 percent — a trend MCI estimates would halve the population in less than 20 years" The impact on Monk Seals due to rain events, tropical storms and hurricanes polluting the ocean via Waipio Valley with manure, urine, nitrogen, phosphorous, hormones and other fertilizers used by HDF needs to be address in the EIS.

Fish

The Reef Environmental Education Foundation recorded 24 species of fish at Kawaiola Bay (Māhā’ulepū), and 43 species at Kīpū Kai. An additional eight appeared in records kept by proprietors at Kīpū Kai. Kaua‘i residents describe the near shore waters of the study area as a “prime fishing area.” Telltale pipes for holding fishing poles are embedded at favored sites along the shoreline. Fish abundance is also implied by the presence of monk seals — the seals feed on reef fish as well as octopus, lobster, and eel (MIKRS). The EIS needs to address how HDF will protect the fish species during rainy season, how the algae causing pollutants will be monitored and how the stream and ocean would be cleaned up. The EIS needs to address coral death caused by nutrients and algae blooms as coral is an intricate part of the environment. Climate change needs to be addressed in the EIS as the culminate effect of higher nitrogen and phosphorous levels in the waterways could cause faster algae blooms leading to rapid coral death.

Algae

“We saw no invasive or alien algae” (MIKRS) This is the condition of Maha’ulepupu waters now, but in New Zealand it’s a different story. “Already choked with weeds and algae, waterways will get even worse as the dairy industry continues to boom,” the Environment Commissioner says. Poor-water quality is caused by the run-off of nutrients from farm land, which breeds invasive weeds, slime and potentially toxic algal blooms” (Waterways will get worse – Commissioner, article in NZFarmer.co.nz 2013). Nutrients, urine, manure entering the waterways and groundwater from runoff is likely because of the low Ksat of the two major clay soil types found on HDF site (Custom Soil Resources Report for Island of Kauai 2014) (CSRRIL). These issues need to be elucidated in the EIS. The likelihood of contamination of seaweed that is collected for human consumption needs to be addressed in the EIS.

Wetlands

The portion of Māhā’ulepū watershed that lies within the study area stretches from the Hā’upu ridgeline southward through Māhā’ulepū valley and eastward to the coast. Agricultural operations began in the mid-1800’s in Māhā’ulepū valley; its intermittent streams and wetlands were long ago modified for irrigation purposes. The landowner Grove Farm operates a water system that includes wells, ditches, tunnels and reservoirs. Māhā’ulepū Reservoir, at the back of the valley, is part of that system. Both it and the County-owned Pu‘u Hā reservoir (at the very southern end of the study area) serve as important attractors for Hawai‘i waterfowl.

A broad natural depression in the valley also fills with water after heavy rains and temporarily draws water birds in large numbers. Though Māhā’ulepū valley’s streams and wetlands were modified, their remnants remain. These expand and become especially visible during wetter periods. The former Waipio Valley Stream, largely subsumed by the ditch system within the cultivated area at Māhā’ulepū, emerges in more natural form near Makauwhai Cave at the south end of the study area, where it joins forces with a natural spring and a remnant of the once much larger Kapunakea Pond. This wetland junction attracts waterbirds and serves as nursery habitat for native fish. It is linked hydrologically to the important Makauwhai Cave Reserve, a critical habitat for endangered arthropods that rely on seepage of nutrient-rich water (MIKRR).

Restoring and protection from cows, manure & urine polluted water of this large wetland area needs to be addressed in the EIS. Protection of the two mentioned area reservoirs needs to be addressed in the EIS. Protection of the area around and in the broad natural depression needs to be addressed in the EIS.

Because all of Maha’ulepupu valley is hydrologically linked to the Makauwhai Cave, any breaches of the effluent ponds have a likelihood of ending up in the cave from weather events, hurricanes, to tropical storms and flash flooding this needs to be addressed in the EIS. The feasibility and positive impacts to the environment of disconnecting the direct access of the irrigation ditches to the Waipio stream and instead being processed as waste water prior to entering the stream needs to be addressed. (Especially in light of the high bacteria counts and turbidity readings of the Waipio this last year- DOH & Surfrider).
We do not want the Waiopili stream to become like the New Zealand streams. "We also need to have a long-term vision about what sort of land use is appropriate according to the sensitivity of the receiving waters" (Waterways will get worse — Commissioner, article in NZFarmer.co.nz 2013). HDF’s land use needs to be reconsidered in Mahaʻulepu, an environmentally sensitive site, in the EIS.

**Arthropods**

Intensifying and adversely impacting land uses and activities poses current and potential threats to important natural and cultural resources within the study area. Kauaʻi’s endangered arthropods in the study area are especially vulnerable to impacts from quarrying and other activity on the marginal agricultural soils overlying their cave habitats. Grading, fill, and excavation result in disturbance, compaction or blockage of the subterranean cracks where these species find refuge during drought. Blocked areas break up the cave system into separate areas, isolating the already small populations and increasing their risk of extinction (MKRS). The further endangering of the arthropods through grubbing and grading activities

**Makauwahi Cave and Sinkhole**

Makauwahi cave and sinkhole is equally important for the light it sheds on Hawaiʻi’s human story. According to scientists working at the site, it contains "in a single stratigraphic sequence an encapsulated view of the full span of human occupation, including the millennia preceding human arrival, earliest human evidence, subsequent population increase and cultural change, European contact, and modern transformation" (Burney and Kikuchi 2006). Due to its neutral pH environment, Makauwahi’s fossil and artifact finds are exceptionally well preserved. Its sinkhole walls surround an ordered column of sediment layers that tell a nearly unbroken tale of conditions on Kauaʻi, from before the arrival of people through the changes wrought by a millennium of human activity. Researchers are piecing together new and detailed views of Kauaʻi’s past based on analysis of the Cave’s sediments, combined with oral and archival sources (MKRS). With the Cave’s hydrological linking to the valley it would seem that cow urine would possibly change the pH of the water going into the Cave, thereby destroying all the perfectly preserved extinct life forms. The possibility of pH change and the impacts thereof need to be addressed in the EIS. An active sand quarry excavation operates adjacent to Makauwahi cave and sinkhole—so close that one small cave opening in the west sinkhole wall rises diagonally only about 50 feet before it ends in a surface collapse at the edge of the quarry (Burney and Kikuchi 2006). Heavy equipment in use at the quarry can sometimes be felt within the cave environment, causing fear of potential rockfall or collapse. A heiau on the quarry site has already suffered significant damage. A future quarry site farther north at ʻĀweoweo may potentially impact dune burials (MKRS). The quarry on HDF’s site needs to be addressed in the EIS for possible burial site as well as artifacts.

**Invasive Alien Plant Species**

Non-Native species dominate parts of the study area, and threaten or encroach on significant resources or the shoreline, at Hulâlia, and on Hāʻupu ridge. Once established, some of these aliens are difficult to remove. Ungulate disturbance destroys native vegetation, increases erosion, and provides fertile ground for invasive species (MKRS). Cows could cause ungulate disturbances thereby increasing soil erosion and giving invasive species a foothold at the expense of the native species. This needs to be addressed in the EIS.

**Weather Hazards**

Environmental events such as hurricanes, fires, tsunamis and landslides are potential study area threats that can not only wreak direct havoc, but also set into motion long-term landscape changes, such as erosion and alien plant invasion, that gradually degrade and destroy native habitats. State officials report that two hurricanes in recent decades damaged the Newell’s Shearwater habitat on Hāʻupu ridge, and allowed invasive species to spread across newly-eroded slopes. Kipu Kai representatives say the mountainsides above their valley were lushly vegetated before the hurricanes. By the time of the National Park Service (NPS) site visit, the slopes were bare and roamed by goats, and a small recent landslide was apparent on the upper part of the access road (MKRS).

The entire study area shoreline is highly vulnerable to storms and hurricanes. Long-term coastal erosion hazard is high at Mahaʻulepu Beach and moderately high at Kawaiola Bay, Hāʻūia, Kipu Kai beaches, and the southern portion of
Niulau (KC 2003). Potential tsunami hazard intensity is considered high along the Māhā‘ulepū coast between Punahoa Point and Hā‘upu Bay, and at Long Beach in Kīpū Kai. These moderately sloped areas are also vulnerable to coastal stream flooding from seasonal rainfall (KC 2003). The EIS needs to address where and how the cows will be protected and or evacuated and the possibility that the cows will be swept into the ocean during a hurricane. The EIS needs to address what will happen to the manure that has been left on the fields near the stream that takes runoff from Ha‘upu ridge and delivers it to the ocean. The EIS needs to consider the alternative of collecting the manure from the fields vs. the planned land application to minimize the threat to the environment. The EIS needs to address the possibility of using the collected field manure in methane gas generators/digesters to produce bio-gas energy.

HDF must prove that there will never be discharge of pollutants from direct surface runoff or ditch discharge into Waiopili stream as it courses directly into the ocean, and that percolation into both shallow and deep groundwater will not contaminate stream, estuarine and coastal waters, especially in light of the hydrologic linking of the valley, streams, aquifers and ocean.

Several state planning documents related to tourism, recreation, and historic trails emphasize the importance of recreational access and resource protection along this coast, especially in light of increasing public use (OSP 1992).

In 1992, Hawai‘i’s Office of State Planning conducted a land use review that recognized Māhā‘ulepū’s “combination of outstanding coastal recreational areas, native coastal strand vegetation, significant physiographic, archaeological and scenic resources.” Anticipating future development pressure, it said “measures will need to be taken to assure that the sensitive resources here will be protected.” Suggested ways to achieve that protection include transfer of development rights and purchase of easements (OSP 1992). The possibility of transfer of development rights needs to be explored/addressed in the EIS.

NCRS Custom Soil Resource Report

On June 5th, 2014, the Natural Resource Conservation Service published a Custom Soil Resource Report focused specifically on the parcel of land intended for use by Hawaii Dairy Farms. The fact of this report, and its findings, was not referenced or included by Hawaii Dairy Farm’s when submitting their current Waste Management Plan for approval to DOH (July 23rd, 2014). Since that filing, Hawaii Dairy Farms has never corrected this omission or explained their lack of any reference to this document or its findings. That omission must be corrected, and the NCRS findings need to be specifically addressed by the EIS.

The Custom Soil Resource Report states that, virtually all of the soils underlying the site have “very limited” capacity for disposal of manure through irrigation. The soils were also determined to be highly susceptible to surface water runoff. The study concluded that the soil types in the area have anywhere from “medium” to “very high” likelihood of surface runoff. The study further concluded that soil remediation on the scale necessary was not feasible.

Water

There are at least three County Wells (F, C, and D­ in order of proximity) dangerously close to the proposed farm property that would be covered by planned land applied waste from grazing cattle as well as pumped de-sludged waste residue. These three wells provide the potable water for all of Poipu and most of Koloa. Well F, the nearest, is less than 750 ft. from Block H, a parcel specifically designated for receipt of pumped de-sludge residue. When this same area is actively grazed by cattle (HDF’s Plan identifies specific grazing paddocks at this same site), there will be no less than 100,000 lbs of wet manure, and at least 6,000 gallons of urine applied to and left on this site each day. Unfortunately, this same area happens to contain some of the best draining soil of the farm site (as per NCRS Study and HDF’s latest Plan). Consequently, the migration of both bacteria and harmful nitrates into the wells is a certainty. The EIS needs to establish how this can be prevented.

Conclusion

Not only does the EIS need to address the foregoing, but its EISP is notably deficient in its proposal to consider Alternative Locations. In fact, HDF’s idea of alternatives is to consider taking no further action at the proposed site, operating a CAFO at the same site, or finding one other potential site. If HDF approaches the EIS process using the methods commonly followed during an EIS process, alternatives should encompass consideration of more than one other location at
which their proposed plan could proceed if necessary. In this case however, HDF has predesigned a very limited alternative consideration and the single alternative site, not yet identified, is inadequate to satisfy the intent of the EIS process. It is interesting to note that when discussing the one alternative location in their EIS, HDF states, “The micro-climate requires soil conditions favorable for nutrient absorption with access to a reasonable priced irrigation water source, to sustain nutritious grass pastures.” The EIS needs to address how HDF could possibly proceed at Mahaa‘ulepu when both the NRCS and their own Iowa Based Soil Study indicate that the soils there are anything but “favorable for nutrient absorption.” HDF needs to solidly refute the obvious conclusion that the sensitive ecosystem o’ Mahaa‘ulepu would be irreparably harmed if their Industrial Dairy is allowed to proceed as proposed.

Sincerely,

John (Jay) Kechloian
1722 Keonila Place
Koloa, HI 96756

May 26, 2016

John (Jay) Kechloian
1722 Keonila Place
Koloa, HI 96756

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Mahaa‘ulepu Road
Kaua‘i, Hawai‘i
TMK: {4} 2-9-003: 001 portion and 006 portion
{4} 2-9-001:001 portion

Dear John (Jay) Kechloian:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

SOILS: Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during dry periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawai‘i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.
In this way, "poorly drained" soils may represent less risk of nitrate and nitrite formation out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering, economics, wildlife biology and other disciplines to aid landowners in...
FLORA AND FAUNA: Botanical, avian, and mammalian species of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECONS Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened or proposed for listing under Federal or the State of Hawaii’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the number of plants on the property anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize skieres. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plants species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Makaaulepu Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kauai may overfly the site. The endangered Hawaiian goose, nene was also seen on the site. State Division of Forestry and Wildlife biologists have noted nene are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kauai area, and the habitat present on parts of the site is suitable for nene nesting.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nene goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to project site activities, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

INTRODUCED PREDATOR INSECTS

An invertebrate study of manure-associated insects was conducted for the Draft EIS. The study included a field survey that used manure from an adjacent beef cattle herd as a lure, and determined flies and other manure-related insects currently present and historical uses for intensive agriculture very much limit the number of plants on the property anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize skieres. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plants species will occur as a result of the dairy.

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INVERTEBRATE SPECIES: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Makaaulepu area, as well as the parasites and predators on site that control those species. Fieldwork was conducted during September 15-16, 2014. The entire study is included in Draft Environmental Impact Statement (EIS) as Appendix B.

CAVE AND LAVA TUBE INVERTEBRATES

There are no known caves or lava tubes found at or adjacent to the dairy farm property. The Kauai Lava Tube System, which provides habitat for two endemic cave species, the Kauai's Cave Wolf Spider and the Kauai's Cave amphipod, is located several miles away from the dairy farm property. Both invertebrates are listed as endangered under the US. Endangered Species Act. Not all caves in the Kauai area contain these invertebrates, as many do not contain the optimal climatological conditions required by these organisms. Neither the botanical and faunal survey nor the invertebrate survey revealed any evidence of lava tubes or caves on the property, and no such features have been reported for the area near the Hawaii Dairy Farms (HDF) site. Thus no cave invertebrate species will be affected by the dairy farm.

INTRODUCED PREDATOR INSECTS

An invertebrate study of manure-associated insects was conducted for the Draft EIS. The study included a field survey that used manure from an adjacent beef cattle herd as a lure, and determined flies and other manure-related insects currently present and historical uses for intensive agriculture very much limit the number of plants on the property anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize skieres. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plants species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Makaaulepu Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kauai may overfly the site. The endangered Hawaiian goose, nene was also seen on the site. State Division of Forestry and Wildlife biologists have noted nene are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kauai area, and the habitat present on parts of the site is suitable for nene nesting.

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present at the HDF site. Pest insects such as flies can negatively impact livestock in accordance with regulatory labeling requirements. HDF will implement long-term integrated pest management, which utilizes knowledge of the ancient food web among species by disrupting the manure habitat required to complete the fly life cycle. HDF and other ranchers on Kaua‘i may choose to engage with the State Department of Agriculture to translocation dung beetle species already introduced on Kaua‘i to Māhā‘ulepū and other areas where manure-related flies may be a problem.

IMPACT OF SPRAYS ON BEES

Beneficial insects include primary decomposers such as earthworms and dung beetles, and pollinators including bees. Honey bees are an essential part of any agricultural ecosystem, and were observed on site during the invertebrate species survey. Pesticides and herbicides can reduce populations of beneficial insects, which is why HDF will utilize an integrated pest management approach.

It is expected that honey bees will visit water sources set up for the HDF herd. Preventative measures will be built into any open water source to prevent bees from being trapped, and HDF will contact local beekeepers for advice regarding any bee or bee colonies encountered on site. Safe application practices for any unavoidable herbicide or pesticide will be utilized in order to narrowly target the correct pest species without harming other insects and animals in the area. Anyone using herbicides or pesticides will be properly trained and informed, and if a honey bee colony location appears to be a danger to workers or cattle, or to be in danger itself a local beekeeper will be contacted for advice and removal.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kūloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kūloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick...
alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents a comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,500 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalaheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 0.3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Although the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Surface Water

The State Department of Land and Natural Resources (DLNR) has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; geotextile filter fabric and sediment logs around drain inlets.
Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted ORA to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The deme canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honouliuli District. US Army Corps of Engineers (USACE) in 2013. These protection practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageway; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162.5 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge to the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contribution would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times greater than the estimated potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean
water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report are included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH GWB, dairy neighbors and the local Kaua‘i community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai‘i Dairy Farms": [http://thegwb.com/OEQCKAUAI](http://thegwb.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

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From: MaryLu Kelley <mkelley323@gmail.com>
Sent: Tuesday, February 17, 2015 4:02 PM
To: epo@doh.hawaii.gov; HDF
Subject: Comments on Hawaii Dairy Farm Draft EIS

Aloha,

I am very concerned about the proposed dairy at Maha‘ulepu. I have lived in Lawai for the past 14 years and a 27 year resident of Kauai. I plan to spend the rest of my life on Kauai.

I have some areas of concern that should be included in the Draft EIS:

- I am interested in being a consulted party for the draft EIS clear.
- I am writing today to advocate for a thorough examination of waste management.
- I am writing today to advocate for a thorough examination of air and water quality protection.
- I am writing today to advocate for a thorough examination of herd growth triggers, cultural impacts, alternative actions (including alternative site selection), binding mitigation measures and alternative agricultural uses.

From the base of Mount Hanalei down to the beach, there exist many unmarked sites and burial grounds, as Hawaiians did not label grave sites. We do not know exact locations of many of these sites. I have to know that these sites will not be ruined. The EIS must include a thorough cultural resources study and provide measures to protect these resources.

The EIS must include an integrated pest management plan for fly control with intended biological, mechanical and potential pesticide measures.

There must be testing done to ensure against the drifting of effluent smells into Poipu/Koloa.

Because Maha‘ulepu is one of the last remaining open spaces on the south shore and is beloved by both residents and visitors it is important that binding mitigation measures are included in the EIS. An environmental remediation bond, monitoring regimes with guaranteed community involvement or even a “good neighbor agreement” are examples of mitigative measures that could be binding.

The EIS must include plans for site remediation for when the lease ends or HDF ends operations. How will HDF guarantee that Maha‘ulepu will be fully restored to its current condition? The operation includes buildings, holding ponds, gates and pens, raceways, piping, fencing, and other infrastructure. Will a remediation fund be set up to cover the cost of returning the site to its natural state?

Thank you for accepting my testimony.

Mary Lu Kelley
PO Box 289
Lawai, HI 96765
as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture or a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways are as a "zero-discharge, grass-fed dairy". The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

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Management practices and pasture model applied by HDF maximize grass as the animals in various stages of lactation and rest will be transferred between HDF and healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

Of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven't given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd for cows or calves being moved on or off the farm. To protect the water quality of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of animal health, nutrition, and management. At HDF, all animal health care and any treatment is prescribed use of antibiotics approved by the Food & Drug Administration (FDA) for the treatment of illnesses. Adherence to guidelines for laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH. The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Wai'a Reservoir and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this report were generated by the USDA NRCS website, which allows any Internet user to search an area. The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, and method of application of nutrient materials in order to ensure that the nutrients are utilized as a resource, and not being used for the constituents or components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, and method of application of nutrient materials in order to ensure that the nutrients are utilized as a resource, and not being used for the constituents or components that provide benefit. The NRSR provides technical guidance on applying agricultural waste depending on the water quality standards, related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan Document in December, 2013. The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) was established by Congress in 1934, as a part of the Farm Service Agency (FSA) to provide technical assistance and financial assistance to farmers and ranchers to help them conserve the nation's natural resources. The NRCS provides technical guidance on applying agricultural waste depending on the water quality standards, related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan Document in December, 2013. The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) was established by Congress in 1934, as a part of the Farm Service Agency (FSA) to provide technical assistance and financial assistance to farmers and ranchers to help them conserve the nation's natural resources.
The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalihi Clay at 32 percent, Kaena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

The historical and existing land uses of the project site and surrounding Māhāulepū Valley were examined in the Draft Environmental Impact Statement (EIS), and uses proposed by the Hawai‘i Dairy Farms (HDF) project were evaluated in the context of county and state land use designations for the area. The evaluation of land use is presented in Draft EIS Chapter 4.4, and the project’s consistency with government plans and policies is presented in Draft EIS Chapter 5.0.

The south shore of Kaua‘i is home to some of the most productive farm land in the state, attributed to consistent sunshine, ample fresh water, and a large amount of Class A and B soils (with “A” representing the class of highest productivity soils and “E” representing the lowest). The large tracts of farmland, including those of Māhāulepū Farm and Grove Farm, allow for stability in support of farm ventures, help maintain regional water systems and provide agricultural employment for Kaua‘i residents in addition to fresh, local food.

The project site is on agricultural land in Māhāulepū Valley, an area with a long history of agricultural use as it was the first place in the island chain where sugarcane was commercially grown. The site is in the Agricultural District per State Land Use District designations, and per the County of Kaua‘i zoning ordinance. The site consists of land classified as Prime per the State Department of Agriculture’s Agricultural Lands of Importance to the State of Hawai‘i (ALISH). The HDF site is outside of the County-designated Special Management Area under the Coastal Zone Management Program.

In 2005, the State established Important Agricultural Lands (IAL) by statute. The purpose of IAL is to conserve and protect agricultural lands, promote diversified agriculture, increase agricultural self-sufficiency, and assure the availability of agriculturally suitable lands. The designation process determines land meet physical requirements including contiguity, functional land units large enough to allow flexibility in agricultural production near appropriate infrastructure and water, with high quality soil agricultural productivity ratings under the Land Study Bureau of University of Hawai‘i.

In 2011, Māhāulepū Farm LLC filed a petition with the State of Hawai‘i Land Use Commission to designate 1.533 acres of agricultural lands in Māhāulepū (including 557 acres that make up the HDF site) as IAL. IAL designation meets the objectives of the State HRS §205-42 by contributing to the maintenance of a strategic agricultural land resource base to support a diversity of agricultural activities and opportunities that expand agricultural income and job opportunities. See Figure 4.4-2 in DEIS Section 4.4.

The designation process determined that the land meets a number of physical requirements established in HRS §205-45, including contiguous, functional land units large enough to allow flexibility in agricultural production near appropriate infrastructure and water, with 88.5 percent of the area featuring an overall soil to long pasture-growing season. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.
The cultural assessment examined the potential effect of the project on cultural resources, practices, or beliefs. The potential to isolate cultural resources, practices, or beliefs which may alter the setting in which cultural resources, practices, or beliefs are found and is currently used for traditional cultural purposes. However, the dairy project, as proposed, does not affect the setting in which cultural resources, practices, or beliefs are found and is currently used for traditional cultural purposes.

No site has been found that has been used or modified by traditional cultural practices. The Hawaii State Cultural Heritage Act, 3-12-17-6, is a federal law which requires the review of cultural resources in federal projects. The cultural assessment examined the potential effect of the project on cultural resources, practices, or beliefs. The potential to isolate cultural resources, practices, or beliefs which may alter the setting in which cultural resources, practices, or beliefs are found and is currently used for traditional cultural purposes. However, the dairy project, as proposed, does not affect the setting in which cultural resources, practices, or beliefs are found and is currently used for traditional cultural purposes.

Agricultural productivity rating of “B” per criteria established by the Land Study Bureau of the University of Hawaii. The agricultural productivity rating of “B” per criteria established by the Land Study Bureau of the University of Hawaii.

Overall, the project provides long-term benefits as it supports diversified agriculture, food production, and agricultural self-sufficiency. HDF is a multi-criteria project that supports diversified agriculture, food production, and agricultural self-sufficiency. HDF is a multi-criteria project that supports diversified agriculture, food production, and agricultural self-sufficiency.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing plant species. The survey also investigated for the presence of native Hawaiian rights or any ethnicity-related group related to the land. A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing plant species. The survey also investigated for the presence of native Hawaiian rights or any ethnicity-related group related to the land.

Avian and mammalian surveys were conducted in August 2014 by Rama Biological Consulting, Inc. to assess the potential presence of avian or mammalian species currently listed as endangered, threatened, or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Avian and mammalian surveys were conducted in August 2014 by Rama Biological Consulting, Inc. to assess the potential presence of avian or mammalian species currently listed as endangered, threatened, or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity.

No long-term impacts to native plant habitats or endangered plant species will occur as a result of the dairy project. No long-term impacts to native plant habitats or endangered plant species will occur as a result of the dairy project.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-contact or early historic times. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-contact or early historic times.

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Four species of endangered waterbirds were recorded on the site and at the nearby Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essential ly, IPM disrupts reproduction with appropriate invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 in the vicinity of the dairy site. The cattle egret is a generalist predator of invertebrates, and its introduction to the area is believed to have had a negative impact on local invertebrate populations. As a result, the cattle egret has been targeted for removal as part of the IPM program at HDF.

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The aquifer of highest value and use resides deep within the unweathered volcanic material. The aquitard material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the aquifer that underlies Māhāʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvium material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.
Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dene canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. HDF operations are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times greater than the estimated potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downdraft from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively dispenses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean
water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollution. The National Ambient Air Quality Standards (NAAQS) for six criteria pollutants are established to ensure public health and welfare. Air quality conditions, and project impacts were evaluated, including dust and odor, under the Draft Environmental Impact Statement (EIS) for the HDF project. The ongoing testing program will provide feedback to the dairy management team to help ensure that emissions are kept below the threshold of perception, which is defined by the point at which 50 percent of the panelists can detect the odor. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of the panelists can detect the odor. Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year. The parameters used in the analysis were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of the panelists can detect the odor. Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year. The parameters used in the analysis were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of the panelists can detect the odor.
intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown. It is likely odor detection beyond the HDF boundaries will be less frequent.

**ALTERNATIVES:** As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai’i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities, (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope condition, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
• Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
• Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
• Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

Frank & Marilyn Kelly
3596 Old Mill Place
Ko‘olau, HI 96765

February 23, 2015
Via Certified Mail, Return Receipt: Requested:

Laura McIntyre
State of Hawai‘i
Department of Health
1250 Punchbowl Street
Honolulu, HI 96813

Group 70 International Inc.
3925 Bethel Street, 5th Floor
Honolulu, HI 96813

Jeff Overton
Hawai‘i Dairy Farms, LLC
P.O. Box 1680
Ko‘olau, HI 96765


Dear Ms. McIntyre,

We have followed the notices regarding the proposed industrial dairy in Meh‘ulepua Valley. Please accept these scoping comments of ours concerning Hawai‘i Dairy Farm’s (HDF) January, 2015 “Environmental Impact Statement Preparation Notice (EISPN). We apologise if our comments lack professional presentation or fail to cite scientific reports. We are local residents alarmed that such a project would even be proposed for Ko‘olau, much less the environmentally and culturally sensitive (and environmentally unsuitable) Mahahupu‘u Valley.


Mahahupu‘u is a traditional Hawaiian ahupua‘a running from the Ha‘upu mountain range to the shoreline on Koolauloa’s southeast shore. Natural and cultural resources in this area have been identified which hold significance for the native Hawaiian population. The area also provides significant recreational and enjoyment opportunities for the general population. Please make sure these are thoroughly identified and the probable detrimental impact evaluated in the EIS.
May 26, 2016

Frank and Marilyn Kelly
3566 Old Mill Place
Koloa, HI 96756

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā'ulepū Road
Kaua'i, Hawai'i

TMC: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Frank and Marilyn Kelly:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai'i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā'ulepū Valley on the island of Kaua'i to produce fresh, locally available nutritious milk for Hawai'i families. The rotational-grazing method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPON), published January 23, 2015, described the proposed pasture-based rotational grazing system as a "zero-discharge, grass-fed dairy." The term "zero-discharge" under the U.S.
Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to monitor and control the discharge of pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the dairy facilities' waste products to increase net carbon storage, and improve and maintain water quality. The term "grass-fed" was used in the HDF EIS. This term is used to identify the dairy farms' primary food source, method of application, and timing of plant nutrients and soil amendments. A project of several northwest colleges, the Grass Fed Alliance, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of "grass-fed," the term is not used in this EIS. The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic manures, water, water quality, and nutrient balance. The Washington State University Cooperative Extension Service will provide technical guidance on applying agricultural waste depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for cattle is the practical application of the waste. The NWCA provides technical guidance on applying agricultural waste depending on the desired use of the waste. The Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality and reduce nutrient leaching, temporary pastures are located near and away from permanent water bodies. The irrigation system is controlled using computer software and GPS receivers to allow pivots to rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm. The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area is the area where the additional buildings will be constructed, and the buildings will be constructed using different functions, including additional buildings. The committed herd size of 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. Results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows' diet. The ponds are designed to provide a comfortable path under hoof. The gentle sloped paddocks, walkways, and cow races are designed to provide a comfortable path under hoof. The committed herd size of 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. Results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows' diet.
Animals in various stages of lactation and rest will be transferred between HDF and the user would like to display. These user-generated reports are not evaluated by other partner ranches as needed for animal health and dairy productivity. This will be handled by the NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kahili Clay at 32 percent, Haina Clay at 29 percent, and Kahili Clay at 14 percent. Laboratory analysis of soil samples collected in 2014 identified organic matter, salinity, micronutrients, and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for agriculture and rely on the ability of water to enter the soil surface, whereas "drainage" refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen, phosphorus, calcium, magnesium, and potassium.

Laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will implement a sampling plan that ensures the safety of milk and minimizes the risk of contamination. The dairy's focus on robust and healthy grass growth will build organic matter in the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbon in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide.

The dairy’s focus on robust and healthy grass growth will build organic matter in the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbon in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. With low risk, phosphorus can be applied at rates greater than crop requirements if the potential soil organic matter and carbon dioxide sequestration benefits are likely greater in highly degraded soils in warm subtropical climates, partly due to low temperatures and high rainfall.
exercise of native Hawaiian rights or any ethnic group related to numerous
cultural practices will not be impacted by establishment of the dairy.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai'i Dairy Farms
(HDF) to the existing economy were evaluated in the Draft Environmental Impact
Statement (EIS), including a fiscal impact assessment report completed in April,
2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic
and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local
construction personnel and local material suppliers. Such jobs would include
equipment operators, cement workers to lay foundations, metal workers,
carpenters, plumbers, electricians, monitors, supervisors, painters, etc. Based on State
employment multipliers, indirect employment related to Dairy construction would
be expected to average about 12 jobs per year during the
development period. This direct-plus-indirect employment association with construction
would be expected to average approximately 36 jobs, of which 28
would be on Kaua'i.

The HDF project would contribute to diversification of Kaua'i's economy, which is
heavily based on the visitor industry. With only two dairies remaining in the State
(both on the Hawaii Island), approximately 10 percent of Hawaii's milk is locally
supplied. The HDF project, with an established herd of up to 699 mature dairy cows,
will increase the supply of local fluid milk by approximately 1.2 million gallons of
milk annually, a 50 percent increase in statewide milk production. On-going dairy
operations at the committed herd size will provide approximately 15 direct and
indirect full-time equivalent jobs on Kaua'i, including 5 farm jobs and about 11
indirect jobs. An additional 6 indirect jobs related to on-going dairy operations
would be created on O'ahu.

HDF is expected to generate a net income of approximately $68,000 to the County
when the 699 cow herd is established. When the dairy has matured to full
production for the 699 cow dairy, net income to the State is calculated at $160,000
annually. With the potential contemplated herd size of up to 2,000 mature dairy
cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be
produced. This would double local milk production currently supplied by operational
dairies on the Island of Hawaii.

Additional employment generated by a possible expansion to accommodate the
contemplated 2,000 mature dairy cow herd is estimated at approximately 3
construction jobs plus 4 indirect jobs on Kaua'i, and 2 indirect jobs on O'ahu for a
total increase of 9 jobs. For on-going operations at the contemplated herd size, an
additional 5 full-time farm jobs would be added, with approximately 15 additional
indirect jobs on Kaua'i and another 8 indirect jobs on O'ahu.

The dairy is expected to generate a net additional contribution to the County of
approximately $8,000 for improvements related to expansion for the contemplated
herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the
committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawaii Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Ken fishyfishy@hawaii.rr.com

May 26, 2016

Dear Ken:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

Your comments were received by the State of Hawai‘i Department of Health Environmental Planning Office. The Department of Health forwarded a copy of your comments to Group 70 International in order to be included in the Draft Environmental Impact Statement (EIS) analysis. This letter was prepared in response to your comments.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**NATURAL HAZARDS:** The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhā‘ulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai‘i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone. The Kaua‘i and Ni‘ihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands.

Although they occur infrequently, Kaua‘i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhā‘ulepū region during and following the hurricanes that affected Kaua‘i in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhā‘ulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua‘i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRES, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix I.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction

HDF is committed to expanding operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

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employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment associated with construction would be expected to average approximately 36 jobs, of which 28 would be on Oahu.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawaii Island), approximately 10 percent of Hawaii’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 12 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on Oahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 44 million gallons (36719780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawaii.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on Oahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on Oahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawaii Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kūloa area was built by Napali formation lavas of the Waima volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhū‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kūloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor; and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketting the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhū‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kūloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhū‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaii Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhū‘ulepū 14 well during the sugarcane
through the HDF site are collected by the Makalapa Water Hydrologic Unit, which features relatively high precipitation with relatively long dry seasons. The Makalapa Water Hydrologic Unit has an area of approximately 1,000 square km and is served by several intermittent streams, with only one permanent stream, the Mānā Stream, running through the area. The Mānā Stream is the primary source of water for the Mānā Stream area, which includes the HDF site. The Mānā Stream has a mean flow of 27 cubic meters per second and a mean annual flow of 37,500 cubic meters per day. The stream is classified as a Class IV stream according to the State of Hawaii's Water Quality Criteria. The stream is a major source of water for the HDF site, providing a significant amount of water for irrigation and other uses. The stream is also home to several species of fish and other aquatic life, including the highly endangered Honu (Hawaiian Green Turtle). The HDF site is located on the bottom-up gradient of the Mānā Stream, which is characterized by a steep slope and a high flow velocity. The site is thus well-positioned to exploit the natural resources available in the area, including the water and the fish.
maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35 feet from the top of drainageway (totaling 70 feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipoli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the CAA standards.
NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylot" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated expanded herd size of up to 2,000 milking cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 milking cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670 feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 milking cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the DEQ website at the following URL search “Hawaii Dairy Farms”.

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, ACP, LEED AP
Principal Planner
February 22, 2015

Sinclair W. Kinsey
29 Prospect Ave.
Hood River, Oregon 97031

State of Hawaii
DOH
Attn: Laura McIntyre
1250 Punchbowl Street
Honolulu, HI 96813

Subject: Hawaii Dairy Farms, Maha’ulepu

Dear Ms. McIntyre

For the last fifteen years my wife and I have been annual visitors to Kauai and in that time have gotten to know the island well and are fortunate to have met many wonderful people and have made friends. Many times we have gone to Maha’ulepu and with every visit we are struck by this unique natural wonder.

Kauai is not our full-time residence and as such I feel I’m not qualified to address every resource that would be adversely affected by HDF’s proposal. However, we live in a town situated in the Columbia River Gorge National Scenic Area, so we have an intimate connection to an outstanding and protected landscape. Also, we often visit the north coast of Oregon, driving through and near the town of Tillamook, known for its dairy farms and cheese production. Although the dairy industry there is ubiquitous and is an important segment of the local economy, these operations are not near the 82.5 cows per acre intensity of HDF’s proposal. One impact that is certain to all who live in or near Tillamook or have visited the area is the foul smell emanating from these farms which most of the time is intense and onerous.

There is no doubt in my mind that the prevailing Trade Winds out of the northeast would bring a stench to the Poipu area and beyond that would impact all who live and visit there. The detrimental effects to the resort and tourist businesses in the area would be heinous.

Maha’ulepu is a striking landscape that is rich in scenic, natural and cultural resources that deserve consideration for protection. It is my hope that a third party lands trust will facilitate the purchase of the entire property to be held and protected in perpetuity.

Thank you.

Sincerely,

Sinclair W. Kinsey

Cc: Hawaii Dairy Farms, LLC; Group 70 International, Inc.
Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows' manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1. Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāʻulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob”, mimicking the natural social order of herds. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof.
Animals in various stages of lactation and rest will be transferred between HDF and pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven't given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and component in handling procedures and the use of antibiotics approved by the Food & Drug Administration (FDA). Routine use of antibiotics may be needed for treatment of illnesses. Adherence to guidelines that prohibit milk from cows not specified with bovine growth hormones, referred to as BSE or RBD.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigation systems. The timing and application of nutrients will correspond with plant uptake, soil retention, and maintain water quality. The 50% of the pastures will be irrigated with water that is filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to mature dairy cows. The NRCS provides technical guidance on applying agricultural waste, depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for Hawaii, is the parthenial inclusion of the word "waste." Where waste is currently used as a resource, it is being used for the constituent components that provide benefit. The MCE provides technical guidance on applying agricultural waste, depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for Hawaii, is the parthenial inclusion of the word "waste." Where waste is currently used as a resource, it is being used for the constituent components that provide benefit. The MCE provides technical guidance on applying agricultural waste, depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for Hawaii, is the parthenial inclusion of the word "waste." Where waste is currently used as a resource, it is being used for the constituent components that provide benefit.
Annually, with the potential contemplated herd size of up to 2,000 mature dairy cows, the HDF project would double milk production currently supplied by operational dairies on the Island of Hawaii. Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd estimate at approximately 300 employment jobs plus 4 indirect jobs on Oahu, and another 8 indirect jobs on Oahu. Furthermore, the HDF project would provide approximately $660,000 annually in revenue from the contemplated 2,000 mature dairy cows, approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and 4 indirect full-time equivalent jobs, of which 28 percent would be new jobs.

**Environmental and Economic Considerations:**

The potential impacts of Hawaii Dairy Farms Project (HDF) were evaluated in the Draft Environmental Impact Statement (EIS). In April 2014 by Plasch Economics Pacific. EIS Section 4.15 addresses demographic and socioeconomic impacts on communities within the project area. Based on the research and comments received from the community, it is reasonable to conclude that the HDF project, the employment, and operations associated with the project would be expected to create 280 to 290 jobs, including 12 direct and 16 indirect jobs on Kauai and another 8 indirect jobs on Oahu.

**Air Quality:**

As part of the Environmental Impact Statement (EIS), the Hawaii Dairy Farms Project was assessed for environmental impacts. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on-site. EIS sections 4.19 and 4.25 evaluated for dust and odors in the area around the dairy for anticipated construction activities. No State or Federal regulations for greenhouse gas emissions from farm operations or indirect full-time equivalent jobs at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouses gases related to dairy cows include methane (CH4) from enteric fermentation and nitrous oxide (N2O) emissions from manure application and greenhouse gases from manure application. The HDF project is expected to generate a net income of approximately $660,000 annually to the County of Kauai. The HDF project is expected to generate a net income of approximately $660,000 annually to the County of Kauai, to fund critical infrastructure projects and economic development initiatives.

**DEMOGRAPHIC AND ECONOMIC:**

The potential impacts of Hawaii Dairy Farms Project (HDF) on the existing economy were evaluated in the Draft Environmental Impact Statement (EIS). In April 2014 by Plasch Economics Pacific. EIS Section 4.15 addresses demographic and socioeconomic impacts on communities within the project area. Based on the research and comments received from the community, it is reasonable to conclude that the HDF project, the employment, and operations associated with the project would be expected to create 280 to 290 jobs, including 12 direct and 16 indirect jobs on Kauai and another 8 indirect jobs on Oahu.

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DUST

Dust will be generated as cows move along soft limestone walkways that connect
the paddocks and lead to and from the milking parlor. Potential fugitive dust
emission rates were estimated from published literature, where particulate matter
(PM) is measurable from the "drylots" of confined dairy operations where animals
walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates
potential emission resulting from HDF. Cows in the pastoral rotational-grazing
system will be on pasture 22 hours each day and will spend two hours – in two
separate milking cycles – moving to and from the barn for the 10- to 15-minute
milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to
the size of the non-pasture areas used by cows at HDF. Results were added to the
background concentration of particulate matter (both PM10 and PM2.5) measured on
– the island of Kaua‘i, and the total concentration was compared to the State ambient
air quality standards. Only the contemplated herd size of up to 2,000 mature dairy

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of
organic matter in manure. No animals or dairy facilities currently exist in the area
leased by HDF, so air dispersion models were used to determine potential odor
levels. Local weather data was used in conjunction with the AERMOD modeling
system, and published rates for manure odors emissions for dairy heifers and
effluent ponds were adapted to reflect the HDF facilities.

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fields, irrigation water containing diluted nutrients from effluent, the effluent
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at the threshold of perception, which is defined by the point at which 50 percent of
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wind velocity / mixing). Generally, tradewinds will disperse odors to less than
detectable levels beyond the HDF site; in periods of no wind, odor may not be
dispersed creating the "worst case" scenario. In these periods without normal
tradewind flow, the odor plume would extend to the south of the HDF site. Sections
4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may
be detectable by 50 percent of the sensitive population once per 200 hours, or 44
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approximately 44 hours per year. The parameters used in the analysis were
intentionally conservative, and the impacts shown assume an unlikely confluence of
worst-case meteorological data, irrigation location, and grazing location. Actual
offsite odor impacts are likely to be much lower and/or less frequent than shown; it
is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact
Statement (EIS). The Draft EIS is available on the OEQC web site at the following
URL, search "Hawaii Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

GROUP 70 INTERNATIONAL, INC.
Group 70 International  
Attn: Jeff Overton, HDF Project  
925 Bethel St. 5th Floor  
Honolulu, HI 96813  

Dear Mr. Overton,  

I have been a resident of Koloa for over 42 years and Maha'ulepu has been a special place for my family in all of those years. I share the concerns of the community regarding the environmental and cultural impacts of an industrial dairy in Maha'ulepu valley. However, The Hawaii Environmental Policy Act also refers to economic effects, including adverse effects, in Chapter 2.7. I hope the EIS will address the soundness of the Hawaii Dairy Farm as a business. Please consider and realistically assign cost to all the expenses involved in this project and assess the expected return (earnings from milk). Perhaps assign a high and low figure to both the expense and revenue to more accurately analyze the profitability of the HDF venture.

I would like to know what happens when the dairy fails and goes out of business. The environment will have suffered drastic assault by then, including the construction of buildings, holding ponds filled with manure, gates and pens and other infrastructure. How can this damage be mitigated? Is HDF willing to set up a remediation fund to return the site to its natural state?

The EIS must include satisfactory answers to the above questions as well as accurate answers to questions on air quality, soil, hydrology and protection of cultural sites.

Please include me as a consulting party for the draft EIS.

Sincerely,  

Marty Kuala  
P.O. Box 785/5481 Eml Rd.  
Koloa, Hawaii 96756  
Kuala@aloha.net  
742-7393
Dear Ms. McIntyre,

I have been a resident of Koloa for over 42 years and Maha`ulepu has been a special place for my family for all of those years. I share the concerns with my community regarding the environmental impacts an industrial dairy will have on the Maha`ulepu valley and surrounding streams and ocean. Of particular interest to the Department of Health the EIS should provide accurate answers to:

- Ground water contamination – although the holding ponds will be lined with plastic the paddocks where the cows graze will not and manure and urine will seep into the soil and into the streams and wells from which Koloa derives its fresh water.
- Soil and hydrology information for the entire Maha`ulepu watershed including the lava tube system showing that no effluent run off can occur.
- Air quality and pest control has not been addressed in the HDF plan. The negative health effects from odor, biting flies, etc. should be dealt with in depth in the EIS.
- Remediation and mitigation plans if the dairy fails and goes out of business. Effluent ponds left open and uncirculating and flies and other pests left uncontrolled will pose a serious health hazard that the State should not have to remedy. HDF should set aside a fund for this expense.

Please include me as a consulting party in the draft EIS.

Mahalo,
Marty Kuala
P.O.Box 785/5481 Emi Rd
Koloa, Hawaii 96756
kuala@aloha.net / 808-742-7393
were undertaken at HFU to understand and characterize available soil nutrients and movement of water within or from the soil profile. Poorly drained soils typically have lower water infiltration rates, which can lead to increased waterlogging in the soil. This slow movement can create anaerobic conditions, which typically result in lower nutrient levels and increased soil acidity. Poorly drained soils can also lead to the accumulation of organic matter and nutrients, which can be beneficial for plant growth but can also lead to potential environmental impacts such as nutrient leaching and groundwater contamination.

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. In poorly drained soils, these nutrients are more likely to be retained in the soil profile, which can lead to potential long-term impacts on soil quality and productivity. Moreover, poorly drained soils can also contribute to higher levels of soil organic carbon, which can have both positive and negative impacts on soil fertility. For example, while increased soil organic carbon can improve soil structure and water holding capacity, it can also lead to reduced water infiltration rates and increased soil compaction.

The dairy's focus on robust and healthy grass growth will build organic matter in the soil. Grazed pasture can drive substantial accumulation of organic carbon in the soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

A total of sixteen historic properties were identified through a pedestrian survey of the proposed project. Only one of the sites is believed to be associated with pre-contact and/or early historic times. State Site 56-35-14, the agricultural heiau, extends beyond the project boundary. Six historic-era sites occur in the project area and its extended survey area. Only one of the sites is believed to be associated with the proposed project. The NRCS soils classifications and descriptions provide a good information base, subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 12-37. The two NRCS Soil Survey Reports for the Island of Kaua‘i provide a wealth of data to define an area of interest, customize data results, and generate a Custom Soil Resource Report.

The NRCS soils classifications and descriptions provide a good information base, subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 12-37. The two NRCS Soil Survey Reports for the Island of Kaua‘i provide a wealth of data to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select design parameters based on what data the user would like to display. These user-generated design parameters are not evaluated by the NRCS.
The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhāʻēpē Ahupuʻa, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

**PESTS:** A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhāʻēpē area, as well as the parasites and predators that occur among those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly (Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide habitat for drosophila musaphilla, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-ōhi‘a forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize flying breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhāʻēpē Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pads in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōoa-Poipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ala Kōina Road between Kōoa and Poipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized control to reduce pest populations need to address breeding sites in and amongst the food and animal wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i’s Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plush Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix I.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local milk products by approximately 1.2 million gallons of...
alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley and the HDF site ranges from 103 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater instead of freshwater. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site groundwater pumping. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.
Though the waterbody in which the County wells occur is confined and hydrologically separated from the shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kūola Well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwaters in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa-Po‘ipū-Kalāheo districts), water use in 2035 is projected to be 32.4 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off the south slope of the Ha'upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed around drain inlets.

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Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Green Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the National Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways;
only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūlu'epali will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). While this nutrient runoff would not occur as chronic daily releases, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōlos-Po'ipū region were also calculated. Nitrogen input to the marine environment in the Po'ipū region is estimated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment:** An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipōli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kauai community.

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai'i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases, more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

**DUST**
Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM$_{10}$ and PM$_{2.5}$) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM$_{10}$ is 2.01 μg/m$^3$, well below the State standard of 150 μg/m$^3$. The estimated concentration for PM$_{2.5}$ is 0.23 μg/m$^3$, well below the Federal standard of 35 μg/m$^3$ (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawaii Dairy Farms": [http://tinyurl.com/OEQCKUAU](http://tinyurl.com/OEQCKUAU)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
I am disturbed by the potential—proven in many, many rural areas throughout the U.S. and elsewhere—for storage tank and lagoon spills, and accidents which can be exacerbated or precipitated by natural events such as hurricanes. Flooding, reservoir breaches and heavy rainfall (events which I have witnessed many times in my 27 years on Kauai).

I am disturbed by the all too likely effects of all of the above to our quality of life, our livelihoods, my own business, the investment I have made in my home and family here in Pupu, my health and that of my wife and daughter and neighbors.

I am disturbed by the potential amount of stench and flies an operation of this size will generate, and the effect it will have on my quality of life and my business—which depends heavily on the Grand Hyatt Kauai, the Point at Pupu, Poipu Kai and Kiahuna for customers. If their bookings go down, we suffer.

I have done extensive reading and research on water quality in the U.S. related to large dairies of the kind proposed by HDF, in Iowa, Washington State, California, Wisconsin, Missouri and Pennsylvania—and there is a clear record of increased pollutants in both surface and groundwater, not to mention a record of violations, spills and fines in these areas.

I sincerely hope you will take these things into account in your efforts to conduct a thorough and impartial EIS.

And thank you for your efforts and attention.

Sincerely,

Steven Lauyn
2219 Lake Rd.
Koloa (Pupu), HI 96756
May 26, 2016

Steven Lauryn
2729 Lake Road
Iolika, HI 96756
lauryn@koamoon.com

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhāulepū Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Steven Lauryn:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhāulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed.” The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed,” the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed subsidies and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 65 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestive cycle. The animals are managed in social groups known as “mobs,” mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways...
and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawaii is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, source, method of application, and timing of nutrients to correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrition for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāʻulepū site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as BST or rBGH.  

SOILS: Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during dryer periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawai‘i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included “Custom Soils Resource Report for Island of Kaua‘i, Hawai‘i.” The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data was desired.
The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalihi Clay at 32 percent, Kalena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas “drainage” refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrate and nitrite to gaseous forms, which reduces the potential for impacts on waterbodies. In this way, “poorly drained” soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than “well drained” soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai’i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to off-set up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing season. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

**NATURAL HAZARDS:** The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhā‘ulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai‘i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone. The Kaua‘i and Niihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands.

Although they occur infrequently, Kaua‘i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhā‘ulepū region during and following the hurricanes that affected Kaua‘i in 1992 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent pond since rainfall has been recorded in Māhā‘ulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua‘i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.
A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā‘uleπī area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and horsefly, the latter known for biting cattle. These flies and the greenbottle fly are often confounded with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean-up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drōsophila musāphīla, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-‘ūhi forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhā‘uleπī Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pits in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kō‘a-Po‘ipi‘i region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ala Kinoiki Road between Kō‘a and Po‘ipi‘i, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animal waste within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.
DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai'i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kauai's, and 8 on Oahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kauai's.

The HDF project would contribute to diversification of Kauai’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawaii Island), approximately 10 percent of Hawaii’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kauai’s, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on Oahu.

HDF is expected to generate a net income of approximately $60,000 to the County when the 699 cow herd is established. When the dairy is expanded to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 44 million gallons (367,197,000 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawaii.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kauai’s, and 2 indirect jobs on Oahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kauai’s and another 8 indirect jobs on Oahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.
volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai'i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā'ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā'ulepū 14 well and the County's Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā'ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua'i community.

Regional Water Demand: The adjacent, developed Kōloa-Po'ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua'i will increase county-wide by 17,300 residents by 2030. The South Kaua'i population is estimated to reach 16,855 in 2035, when it is projected to encompass 152 percent of the County population. For the South Kaua'i region (the Kōloa - Po'ipū - Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island's infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā'ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā'ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā'ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha'upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā'ulepū Road. This ditch, named Waiopili Ditch, is fed by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. B built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua'i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā'ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhā'ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs...
from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture production system. A single load of 699 mature dairy cows and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kūloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 56,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations
were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a wind rose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours—in two separate milking cycles—moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission source identified for modeling at HDF were manure in the pastures, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity/mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods, without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawai'i Dairy Farms": [http://tinyurl.com/OEQCIAAJ](http://tinyurl.com/OEQCIAAJ)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Debra Lee-Jackson
P.O. Box 662201
Lihue, HI 96766
hulepafarm@gmail.com

Subject: Hawai'i Dairy Farms

Environmental Impact Statement Preparation Notice
Māhāulepue Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Debra Lee-Jackson:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time that HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

ARCHAEOLOGICAL AND CULTURAL: The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHP Division) under HRS Chapter 6E and Chapter 13-296. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeological and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with prehistoric sites. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising, given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic-era cultural materials associated with the many Land Commission Awards in the project area were non-existent, as explored through survey and subsurface exploration.

The sixteenth historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on land owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bone collections were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhāulepue Ahupua‘a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully endorsed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

FLORA AND FAUNA: Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing plant species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened or proposed for listing under Federal or the State of Hawai‘i’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its
present and historical uses for intensive agriculture very much limit the natural

and F. The location and connectivity of groundwater bodies were determined, and

botanical resources anticipated to occur on this land. Complete species lists are

included in the EIS, and no protected botanical species occur on the project

property. The project will include vegetated buffer strips along the drainage ways as

Hydrology: the ability of soils to transport water given a hydraulic gradient, and is expressed in the

units of feet per day. It is a measure of how easily water will move within the

groundwater and surface water analysis conducted for this Draft EIS identified
two groundwater bodies within the valley: (1) groundwater located in a deep
aquifer that is composed of weathered volcanic material. The alluvial material covering
the valley is less permeable than the volcanic material. This lower aquifer is not
permeable, and the groundwater flow in this aquifer is limited by a confining layer of

The groundwater and surface water analysis for this Draft EIS examined whether

the project will discharge into the lower aquifer contained in the unwettered volcanic
material at depth, which is the source of potable water. The results demonstrate

that the groundwater and the groundwater body in the adjacent Kauai Poupu region is on the order of 10

times slower than the average groundwater.

The principal potential impacts posed to the five endangered species include those

associated with construction activities, and those associated with dairy

and livestock operations following build-out. Measures will be adopted to avoid potential

impacts to the five endangered species. These include fencing and exclusion walls at various

specified areas, marking all structures and fencing with white visibility poles,

including in zones of high visibility. Mitigation measures are further
detailed in DBEDS Section 4.10.2.

It is also likely that Hawaiian honey bees will be affected by the proposed development. The

techniques will be used in the area to reduce the risk of exposure to all Hawaiian species.

While caution will be taken in the area to prevent potential disturbance or vegetation removal,

the dairy farm will affect this land in ways that are expected to

produce in the area to reduce the risk of exposure to all Hawaiian species.

MILEAGE: Technical information on water resources was gathered and evaluated potential

impacts from the proposed Hawi Dairy Farm (HDF) project. Existing conditions

and probable impacts are presented in the Draft Environmental Impact Statement

(DIIS) sections 4.16, 4.17, 4.22 and 4.23. In summary, the technical reports are available at

plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County's Kōlā F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōlā F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōlā-Poʻipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the South Kaua‘i population is estimated to reach 16,055 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōlā - Poʻipū - Kalāheo districts), water use in 2005 is projected to be 3,24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built structures are anticipated to fall under the exemption for construction or activities on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The deme canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwbf).

Long-term Operations: Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or
maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35 feet from the top of drainageway (totaling 70 feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application. The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage channels. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa region are also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 14 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipolli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEIC website at the following URL search “Hawai‘i Dairy Farms”, http://tinyurl.com/0G0C3kUA. Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Aloha, Susan Leininger

May 26, 2016

Susan Leininger
2426 Linaka Street
Koloa, HI 96756
(808) 645-0859

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i

Dear Susan Leininger,

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISP), published January 21, 2015, described the proposed pasture-based rotational grazing system...
and cover crops are designed to provide a comfortable path under hoof. The cows primary nutrition source and minimize stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they graze.

The 270 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for calving and during the transition period. The system is designed to utilize 100 percent of the surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks is protected and maintained to protect water quality.

Irrigation systems will be implemented to provide additional and utilized as a resource. It is being used for the constituent components that provide benefit. The NRS Conservation Practice Standard 590, Nutrient management, applies to the irrigation system and distribution of livestock water. Effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows.

The term “grass-fed” is used in the HDF EIS. This term was used to identify the intended sources of feed for the herd. The term is intended to describe a system of raising animals that is consistent with animal welfare and emphasizes animal health and well-being. The term “grass-fed” is used to describe the intended sources of feed for the herd. The term is intended to describe a system of raising animals that is consistent with animal welfare and emphasizes animal health and well-being.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in determining the capability of increasing net carbon storage, and improving and maintaining water quality.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management. Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

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Archaeological and Cultural:

The Hawi Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, Division of Forestry and Wildlife. A Preliminary Prehistoric Impact Assessment (PPIA) was conducted by Akins Consulting, Inc. in January 2016. The PPIA included the identification and assessment of the historic properties on the proposed project location. The PPIA identified 16 historic properties, including 10 below-ground and 6 above-ground properties. The historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic properties occur within the project area, while 10 occur outside the project area. The historic properties are located on land owned by a different landowner. Both sites will not be adversely affected by the project.

A total of six historic properties were identified through a pedestrian survey of the project area. The historic properties are located on land owned by a different landowner. Both sites will not be adversely affected by the project.
An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pats in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Likoʻa ʻO Pupū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ala Kinoiki Road between Likoʻa and Pupū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animal waste within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

NOISE: Existing noise conditions of the project site and the surrounding Māhāʻulepū valley area are evaluated in the Draft Environmental Impact Statement (EIS), along with anticipated short-term and long-term noise conditions associated with the dairy farm and planned mitigation actions. Draft EIS Section 4.12 addresses noise conditions.

Noise can be defined as unwanted sound, a sound that is considered loud or unpleasant, and/or sound that causes disturbance. Research related to noise and livestock focuses on noise levels and minimization of unexpected sounds that cause undue stress on cows. Noise stress results in loss of livestock productivity and thereby financial loss to farmers and ranchers. Little research exists on the sound levels from livestock.

Sound is measured in decibels (dB). The State of Hawai‘i Department of Health (DOH) rules use the A-weighting sound network (dBA) in the HAR §11-46, Community Noise Control. Sound through the air is similar to ripples on a pond of water. In open space without reflection, ripples spread uniformly in all directions and decrease in amplitude further from the source. In free field conditions such as outdoors, amplitude drops by half as distance doubles (OSHA, 2016). When sound passes close to absorbing ground cover such as grassland and fields, the “soft ground” absorbs extra sound as it passes. The Hawai‘i Dairy Farms (HDF) site in Māhāʻulepū Valley is approximately 2 miles from the resort area, and 1.5 miles from the closest residential areas (on land zoned for agriculture). Typical noise currently generated near the HDF site includes truck ingress/egress along private farm roads, agricultural equipment, and cattle and sheep.

Construction work at the project site will involve activities that may generate an increase in noise levels. However, such exposures will be a short-term condition, occurring during daylight hours. Construction vehicles and activities must comply with DOH Administrative Rules. DOH noise control regulation requires a permit for construction activities that emit noise in excess of 78 decibels or that cost a total of more than $250,000. Mitigation measures to minimize construction noise will include the use of mufflers to suppress loud equipment and limitations on the hours of heavy equipment operation.

The dairy farm will utilize milking equipment contained in the milking parlor, and will use field equipment such as tractors. Under HAR §11-46, agriculture is classified as Zoning District Class C, which specifies maximum permissible sound levels of 70 dBA in the daytime and 70 dBA at nighttime. Dairy operations will generate noise in keeping with agricultural zoning of the parcel. The primary noise receptors in the area would be farmers working nearby parcels. Noise from the dairy will not exceed the DOH threshold, and will not contribute to excessive noise in the region.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plachy Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J. The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with the dairy would not exceed the DOH threshold, and will not contribute to excessive noise in the region.

HDF is expected to generate a net income of approximately $60,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be generated per year.
produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $0,600 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $60,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and provideable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16.1 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kīlauea area was built by Napali formation lavas of the Wai‘anae volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘uleπu‘u Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lavas at a shallow depth by secondary eruptions of the Kīlauea series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor; and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘uleπu‘u Valley and the HDF site ranges from 105 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kīlauea-Polipoli region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘uleπu‘u may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater produced by the on-plantation era. All potable water used as wash water will be re-applied to pasture by Napali formation lavas of the Waimea volcanic series. Surfacing lavas of the Napali formation exhibit extensive weathering which may extend to cons iderable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘uleπu‘u Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lavas at a shallow depth by secondary eruptions of the Kīlauea series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

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Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater produced through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘uleπu‘u 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘uleπu‘u 14 well and the County’s Kīlauea F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘uleπu‘u Valley, HDF established a 1,000-foot setback surrounding the Kīlauea F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

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Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sandbags, barriers, and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of Enterococcus to the Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai. Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations: Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles 35 feet from the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sandbags, barriers, and geotextile filter fabric and sediment logs around drain inlets.

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a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 35 times more than the estimate of potential nutrient pass-through from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipo‘olū Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWRL, dairy neighbors and the local Kaua‘i community.

TRAFFIC: The Draft Environmental Impact Statement (EIS) Section 4.18 and 4.25 includes an evaluation of roadways and traffic conditions, along with potential impacts of the dairy farm construction and operation. Primary access to the site is via Māhā‘ulepū Road, a two-way, two-lane road, which is accessible from Kōloa Road (Highway 530) via Ala Kinoiki Road. Within the project area, there is a network of unimproved private agriculture haul roads that provide access to and from Māhā‘ulepū Road.

Roadways in the project area operate smoothly with no periods of heavy traffic. On average, traffic in the region is much lower than urban areas in the state due to the low population of Kaua‘i and rural agricultural demographics of the south Kaua‘i area and Māhā‘ulepū. Traffic on Māhā‘ulepū Road consists of agricultural vehicles, residential and resort visitor traffic.

During construction, the proposed project is not expected to have a significant short term impact on traffic operations in the project vicinity. Additional traffic will be generated during construction, but will return to normal levels after project completion during day-to-day operations. There will be no change to traffic patterns or infrastructure related to the public roads.

Traffic operations along Māhā‘ulepū Road and the surrounding County roads are expected to continue to operate at acceptable levels of service during peak hours of traffic. The projected increase in vehicle movements related to HDF operations for the committed herd size of 699 cows would include 5 daily employees accessing the site, milk tanker and supply trucks every two days, and truck with stock trailer, for a total of 12 additional vehicle trips per day. Daily traffic along Ala Kinoiki Road and Kōloa Road was 8,000 and 6,500 cars daily; HDF-related traffic would add less than one percent additional trips. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area.

At a contemplated herd size of up to 2,000 cows, an additional 11 vehicle trips per day would access the HDF site, for a total of 23 vehicle trips daily. Projections for daily vehicle movements in 2035 for Ala Kinoiki Road and Kōloa Road are 7,200 and 9,500 daily vehicles. HDF-related traffic would add less than one percent. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area. Traffic data is presented in the Draft EIS Sections 4.18 and 4.24.
Construction equipment mobilization will comply with Hawai‘i Department of Transportation and County requirements. Delivery trucks and milk tanker trucks will be in compliance with State and County size and weight limits; no oversized vehicles will be used for ongoing operations.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases, more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlors. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”:

http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.
From: Joan Levy
To: HDF; laura.mcintyre@doh.hawaii.gov
Subject: Objecting to dairy at mahal eps
Date: Tuesday, February 24, 2015 10:07:13 PM

I am a kauai resident for the last 23 years, living in Kapaa. Even tho my home property will not be directly affected by the negative environmental impacts of the proposed dairy in Koloa, I believe the areas addressed in what follows do concern me as a resident of Kauai.

I have spoken with several New Zealanders who echoed the commentary below in terms of the negative environmental effects outweighing any potential economic gain.

This dairy is a bad idea for the good of Kauai and must not be allowed here. Regardless a comprehensive EIS must be performed by agents having nothing at all to do with proponents for the dairy.

I have borrowed the following concerns from a local friend of mine who has clearly articulated the issues:

**Impartial Studies:** One of my first concerns is that the EIS be conducted by a non-partial independent research firm, not an architectural design company already vested in the project. Since there is a current conflict of interest, another firm should be chosen to conduct the EIS. Alternately, the research and reporting consultants should be selected by agreement with other interested parties, DOH and Friends of Mahaulepu.

**Location:** The Mahaluepu location does not seem to meet the needs for soil absorption or water supply, as referenced in section 3.1.3 of the plan. Soil studies show it is mostly clay. The status of previously diverted Waipaku waters has not been determined. An alternate location should be found.

**Regulation:** Referring the EIS Preparation Notice, concerning DOH regulatory reviews at the bottom of p. 2-2 in section 2.3: The 699 cows are all pregnant, producing milk, so how long before the first calf is born and the herd exceeds the existing permits? A Waste Management plan for a large CAFO should be required for review for the EIS.

**Public Health Issues:** The bottom of page 3-3 states there are no existing hazardous elements, however the current measured Waiopili stream pollution levels are hazardous. These independent TestAmerica results are available to the public at the friendsofmahaulepu.org website and Surfrider organization. *Enterococcus bacteria* for the summer sampling is 514/100 ml for Gillin’s beach and 8880/100 ml for Waiopili Stream, dangerously above State standards (35). The yearly average from 19 samples of the Waipili Stream is 9,100, a constant source of pollution into the ocean. If significant data was omitted, can we count on complete accuracy of an EIS report by the same methods of the same company? How can the nearby wells be protected? Groundwater studies indicate the wells will become polluted. The risk to the entire Koloa fresh water supply is extremely high with the plan to pump thousands of pounds of manure sludge from the collection pond down slope to Block H, nearest
the wells. Nitrate toxicity will also result from storm runoff.

**Degradation of Environmental Quality:** The proposed Dairy site can be seen from the roof of my house, which is about 2 miles downwind. We are already affected by winds carrying the GMO chemicals from the same area. The smell of cow manure and flies would also be carried by the strong winds so common to this area. Unlike the Moloaa dairy in summer, where one could drive by and hold your nose temporarily, we will not be able to escape the smell from a Mahalepu dairy operating 24-7 all year.

**Environmental and Economic Welfare, Cumulative Effect:** Major properties, such as the Hyatt resort, are already planning to sell if the Dairy comes in, which would start the de-escalation of property values, that have not yet recovered from the previous economic crisis. Based on the information presented in the HDF plan, and documented New Zealand studies, where the climate is more temperate, major pollution is predictable. Our warmer climate, clay soil and slopes will accelerate the process of manure, nitrates and phosphates into the ocean. The NRCS Custom Soil Resource Report Review indicates that the amount of waste cannot be absorbed by these soils. The polluted ocean, flies and odor would keep everyone from enjoying any outdoor activities at the beaches, shoreline, and our own yards.

The Dairy effect on jobs and tax revenue will never compensate for the job loss at resorts, and the loss of tourism dollars. A major resort reports cancellations already due to news of the future Dairy. All of us depend on tourism, one way or another. I believe that shoreline conservation is something we have a right to protect for all and for the future of Kauai. In particular, a Dairy at this location, only 1 mile upstream, causing waste to flow into the westerly current just east of our most popular major beach resorts, would negatively impact the entire Kauai economy. The project has been advertised as a sustainable project. It is not. The milk will not be processed and stay here on Kauai. Livestock is the most inefficient use of agricultural land for food production. The methane produced by cows far outweighs all other energy conservation methods for Kauai. The methane destruction of the ozone layer, reported as significant over New Zealand, will mean a hotter, dryer climate for Kauai with future draught conditions. Recovery of the climate and the economy would be impossible.

Sincerely,

Joan Levy, kapaa resident, POB 160, Kapaa, 96746

Sent from Joan Levy on my iPad
experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai‘i Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

Dairy Operations: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s commitment to utilize a locally-produced feedstock—grass—for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture or on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastural rotational-grazing dairy provides a local feedstock—grass—as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer; productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality. The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waite Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and
irrigation water. Nutrient management is the practice of managing the amount, rate, time and application of nutrients to ensure their effective use by plants and minimize losses to the environment. It involves the application of principles of conservation, engineering and agriculture to ensure the maximum growth of crops. The NRCS, which was established in 1934, is a key federal agency in the United States that provides technical assistance to farmers and ranchers to help them manage their soil, water and natural resources.

The NRCS provides a wide range of services to help farmers and ranchers manage their land and resources effectively. These services include soil health assessments, nutrient management planning, water quality monitoring, and conservation planning. The NRCS provides technical assistance through a variety of programs and initiatives, including the Conservation Stewardship Program (CSP), the Environmental Quality Incentives Program (EQIP), and the Conservation Reserve Program (CRP).

The NRCS is also involved in research and development to improve soil and water management practices. This includes the development of new technologies and strategies to help farmers and ranchers manage their land and resources more effectively. The NRCS is committed to working with farmers and ranchers to develop and implement sustainable practices that can help to protect the environment and improve the productivity of agricultural lands.

The NRCS is an important partner in the efforts to conserve and protect the nation's soil and water resources. It works with farmers and ranchers to develop and implement sustainable practices that can help to protect the environment and improve the productivity of agricultural lands. The NRCS is committed to providing the technical assistance and resources that farmers and ranchers need to manage their land and resources effectively.

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In this way, “poorly drained” soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than “well drained” soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to absorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai‘i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improved nutrient availability to the physical, chemical, and biological condition of the soil.

**PESTS:** A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā‘ulapu area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often caught with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila maruhana, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation Kaulū‘ū forests.

By populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhā‘ulapu Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pads in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kō‘a-Pu‘u‘ipu region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ala Kinoiki Road between Kō‘a and Pu‘u‘ipu‘i, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized control to reduce pest populations need to address breeding sites in and amongst the food and animal wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix I.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, mowers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on Oahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project will contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. Ongoing dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11
indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operation. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kūloa area was built by Napali formation lavas of the Waimāna volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kūloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kūloa-Poipu region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.033 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāulepū 14 well and the County’s Kūloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāulepū Valley, HDF
established a 1,000-foot setback surrounding the Kīloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kauaʻi community.

Regional Water Demand: The adjacent, developed Kōloa-Pōʻipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kauaʻi will increase county-wide by 17,300 residents by 2030. The South Kauaʻi population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kauaʻi region (the Kōloa - Pōʻipū - Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER
The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed. The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the wetland that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and

prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kauaʻi Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the Department of Health Clean Water Branch (CWB) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. DOH had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacterial levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library.”

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the National Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.
Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūleipii will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not be as chronic as daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōkua-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipio Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWBR, dairy neighbors and the local Kauaʻi community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.11, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaiʻi has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust
emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drysites” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM2.5 and PM10) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM2.5 is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odor emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.
The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).

- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaii Dairy Farms” http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
February 20, 2015

Dear Sir or Madam:

As kamaaina residents of the South Shore of Kaua`i and supporters of Malama Maha`ulepu, we are compelled to share with you our concerns about the establishment of a dairy at Maha`ulepu Valley.

The question that comes up time and again is: Couldn’t the dairy be situated elsewhere away from homes, beaches and resorts?

Our concerns are based on experience, not fear. We remember Waimea Dairy, which in more recent years was owned by Meadow Gold Dairies. From the Westside, Meadow Gold moved to the North Shore and operated a dairy in Moloka`i until 2000. Unpleasant odors during visits to the Westside and North Shore always assaulted our olfactory organs as we approached and passed the dairies.

Remembrance of the dairies always bring back memories of noxious odors. Cow manure is cow manure! They all have very unpleasant, harmful and poisonous fumes that pollute the environment and the air we breathe and compromise human comfort and well-being. Also, cow manure is breeding ground of bacteria and viruses that can cause disease making public health a concern.

With the dairy located so close to the ocean, it’s hard to convince the community that dairy waste will not create in some way runoff that will pollute Kawailoa Bay. Also, swimming and picnicking at Kawailoa Beach, fishing at Black Mountain, walking along the shore and enjoying a leisurely day at Maha`ulepu may become the joys of yesteryears with the dairy taking over the valley.

Equally important to us as supporter of Malama Maha`ulepu is our concern that a dairy at this pristine valley will destroy the natural, cultural and historical heritage for which Maha`ulepu is appreciated and loved by residents and visitors alike.

Malama Maha`ulepu’s mission is to take care of Maha`ulepu, educate the public about it and preserve it for future generations. The question is: Is Hawai`i Dairy Farms putting an end to this mission?

In closing, we urge Hawai`i Dairy Farms to find another site for the dairy.

Mahalo and Aloha,

Karl & Catherine Lo
P. O. Box 887
Koloa, HI 96756
Tel.: (808) 742-7237
Email: cpl123@hawaiiantel.net
May 26, 2016

Karl & Catherine Lo
cath.bly@icloud.com

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhāulepū Road
Kāna‘i, Hawai‘i

Dear Karl & Catherine Lo:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**ARCHAEOLOGICAL AND CULTURAL:** The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic era cultural materials associated with the many Land Commission Awards in the project area were nonexistent, as explored through survey and subsurface exploration.

The following responses are offered to your comments:

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own *State Ambient Air Quality Standard*.
Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

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Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylot" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

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Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach residential or recreational areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual off-site odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

alternatives: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawaii Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural
Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

GROUP 70 INTERNATIONAL, INC.
Dear Paul Lucas:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. This direct-plus-indirect employment association with
The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimāna volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane
plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāulepū 14 well and the County’s Köloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāulepū Valley, HDF established a 1,000-foot setback surrounding the Köloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Köloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the Kaua‘i population will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Köloa - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococci to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococci in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhāulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāulepū Valley. The deme canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).
maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35 feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on a episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po'ipū region were also calculated. Nitrogen input to the marine environment in the Po'ipū region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment:** An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipouli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua'i community.

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix L.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the
NAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

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Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles –moving to and from the barn for the 10- to 15-minute milking sessions.

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Results for the committed herd size of 699 mature dairy cows show that odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaii Dairy Farms”: http://tinyurl.com/CE0QKAV/A

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
From: dragonflydesignshawaii@gmail.com
Sent: Sunday, February 22, 2015 2:39 PM
To: HDF
Cc: epo@doh.hawaii.gov
Subject: concerning Hawaii Dairy Farms at Maha'ulepu, Kauai

How will you stop run-off into the ocean when you are so close to the water?
What clean up measures are you prepared to undertake when pollution does occur?
Maha'ulepu has been used for agriculture in ancient times, but not the intensive grazing of dairy cows on unnatural terrain.

Why not locate on the Highway side of Haupu ridge where cattle has already been grazed on lush grasslands and the animals would be cooler?
Do you even care about the animals or just the money in your pocket?
Why not organic free range cows? This farm would be a source of pride for the people of Kauai, the only organic dairy farm in Hawaii, and we'd all be healthier drinking organic milk.
How will you prevent the pollution of the marshland where the Nene nest?
sincerely,
Christina Lynam

May 26, 2016

Christina Lynam
dragonflydesignshawaii@gmail.com

Subject: Hawai'i Dairy Farms

Dear Christina Lynam:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai'i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā'ulepū Valley on the island of Kaua'i to produce fresh, locally available nutritious milk for Hawai'i families. The rotational-grazing method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISP), published January 23, 2015, described the proposed pasture-based rotational grazing system as a "zero-discharge, grass-fed dairy". The term "zero-discharge" under the U.S. Environmental Protection Agency related to concentrated feeding operations...
(CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows' manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term "zero discharge" as it was construed as no nutrients into the system.

The term "grass-fed" was used in the HDF EISP. This term was used to identify HDF's intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds' diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of "grass-fed". The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of "grass-fed", the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area "footprint" will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.5.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd's primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient "dry matter" grass yields essential to a cow's diet. Additional project-specific trials at the Māhā‘ulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows' diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as "mob", mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximize grass as the cows' primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditches banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word "nutrients." Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves' initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kauai to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā‘ulepū site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and
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the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 94,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF in the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kau‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kau‘i will increase county-wide by 17,300 residents by 2030. The South Kau‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kau‘i region (the Kōloa - Po‘ipū - Kalahoe districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off the south slope of the Hī‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waipōlī Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment log around drain inlets.

**Surface Water Quality:** The Kau‘i Chapter of the Surfrider Foundation began collecting water samples in Waipōlī Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality...
assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā`ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhā`ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā`ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of the drainageway (totaling 70-feet in width) to keep cows away from surface water. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic needs of the pasture. HDF operations will apply 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplemental. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water quality analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā`ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge into the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po`ipū region were also calculated. Nitrogen input to the marine environment in the Po`ipū region is calculated to be 38,516 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilizer in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po`ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.
Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB dairy neighbors and the local Kauai community.

ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action's purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action's purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai'i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation easement are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kauai; and (3) milk products processing by HDF. The alternative of "No Action" is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State's fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kauai in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, accessibility (Criterion 1).
- The planned action will generate new long-term employment in the
agricultural sector on Kaua’i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaii Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Sandy Macdougall
sandy_macdougall@gmail.com

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

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sandy macdougall  
may 26, 2016

other partner ranches as needed for animal health and dairy productivity. This will
protective actions taken to address the effects of pasture-reared calves. Male calves will become part of the beef cattle herd, whereas heifers will be retained for the dairy herd. To meet the demand for dairy products, HDF plans to expand the herd to 2,000 head and continue to source all its milk from Hawaii. This may require the purchase of pasture-reared calves. Male calves will become part of the beef cattle herd, whereas heifers will be retained for the dairy herd. To meet the demand for dairy products, HDF plans to expand the herd to 2,000 head and continue to source all its milk from Hawaii. This may require the purchase of pasture-reared calves.

Activities at HDF will be designed to minimize stress to the animals. Cows tend to

exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture

management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows and their udders. Dairy managers and caretakers will be trained and competent in handling

secretes. As much as possible, udder health will be maintained, especially during udder cleaning and after the calving process. The use of udder scrubbers and cleaning

propelers will minimize udder trauma. In addition, udder retraction and milking will

ensure the health of the herd. Any animal showing signs of infection will be treated with the appropriate medicine and removed from the herd. Continue to monitor

the health status of the herd and perform random samples of milk for antibiotic residue analysis.

The majority of the pastures will be irrigated with non-potable water and/or diluted

effluent through the pivot irrigation systems or through gun irrigation. The

application of irrigation water decreases nitrate contamination of soil and groundwater. The

management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

GROUND WATER

The groundwater and surface water analysis conducted for this Draft EIS identified

water quality in the valley, which is typical of the Kīlauea volcanic field. The

amount of the water that is filtered and pumped to the various irrigation components on the farm. The
treatment of water to meet the quality standards for irrigation and drinking water will be

achieved using computer software and GIS receivers to allow for

changing weather conditions. For more information on the water quality of the

future work with the appropriate regulatory agencies.

The hydraulic conductivity of the alluvium, which is the weathered volcano flow, is

estimated to be about 60 feet per day. The alluvium is comprised of black volcanic clay and

deposits. The hydraulic conductivity of the alluvium is highly variable and is comprised of
dark and coarse-grained volcanic clays and sands.

The groundwater and surface water analysis conducted for this Draft EIS identified

the quality of groundwater and surface water was documented.

The groundwater and surface water analysis conducted for this Draft EIS identified

water quality in the Kīlauea volcanic field. The

amount of the water that is filtered and pumped to the various irrigation components on the farm. The
treatment of water to meet the quality standards for irrigation and drinking water will be

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water quality in the Kīlauea volcanic field. The

amount of the water that is filtered and pumped to the various irrigation components on the farm. The
treatment of water to meet the quality standards for irrigation and drinking water will be

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future work with the appropriate regulatory agencies.

The hydraulic conductivity of the alluvium, which is the weathered volcano flow, is

estimated to be about 60 feet per day. The alluvium is comprised of black volcanic clay and

deposits. The hydraulic conductivity of the alluvium is highly variable and is comprised of
dark and coarse-grained volcanic clays and sands.
Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai’i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāulepū 14 well and the County's Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occurs is confined and hydrologically separated from shallow groundwater in the Māhāulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua’i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po’ipū region shows large and increasing demand for potable water for community and resort development.

The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua’i will increase county-wide by 17,300 residents by 2030. The South Kaua’i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua’i region (the Kīloa - Po’ipū - Kalahēo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hā’upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua’i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāulepū Surface Water Hydrologic Unit as the remote areas are on private lands.
Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The
natural fertilizer from manure deposited directly to pasture and effluent collected
from the milking parlor is insufficient to meet the agronomic need of the pasture
grass crop with the committed herd size of 699 mature dairy cows, and
supplemental commercial fertilizer will be required. Nutrients required to sustain
the 470 acres of pasture are the same for the future contemplated herd size of up to
2,000 mature dairy cows, though the proportion of nutrients supplied as natural
fertilizer (manure and effluent) and commercial fertilizer changes. With the
potential future contemplated herd size, supplemental nitrogen will be needed, and
a small excess of phosphorus could occur. However, with an increase in dry matter
(DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in
a deficit and require commercial supplementation. Grass yields are anticipated to
increase more than three tons DM per acre with dairy establishment, from the

HDF operations will follow the practice standards of the Natural Resources
Conservation Service (NRCS). These practices include setbacks to reduce runoff that
could carry particles into surface waters. Fences will be erected 35-feet from the top
of drainageway (totaling 70-feet in width) to keep cows away from surface waters.
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create filter strips that could capture particulates during stormwater runoff events.
Another setback restricts application of effluent within 50 feet of the drainageways;
only irrigation water will be used in these areas as needed to maintain the vegetated
buffer and pasture grass, keeping nutrient applications away from waterways.

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching
activities are exempt from the Clean Water Act Section 404. HDF received
confirmation of exemption for maintenance of existing drainage ditches from the
Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional
practices are anticipated to fall under the exemption for construction or
maintenance of existing or new animal walkways, stream crossings, and farm roads
in accordance with best management practices.

current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS
provides additional information.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch
and concerns about the proposed dairy prompted CWB to conduct a “Sanitary
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within the Waiopili Ditch and areas upstream, and initiated a series of investigations
into water quality issues. Following EPA standards for a Sanitary Survey, DOH has
completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The
Sanitary Survey found no significant impact to the ditch from any activity that could
be attributed to the dairy. Feral animal waste, decaying organic debris and inputs
from existing agricultural operations may all be contributing factors in the indicator
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the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce
bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private
property, and is not an inviting recreational body of water utilized by people. The
Sanitary Survey can be accessed on the DOH Clean Water Branch website under

Establishment of Water Quality Monitoring: Long-term ocean water quality
monitoring will be instituted in conjunction with the surface water quality

The minor contributions of nutrients from episodic rainfall anticipated to occur just
10 days annually from dairy operations will not adversely affect ocean water quality
and the marine environment. The nearshore area is a highly mixed environment
which actively disperses inputs within several meters from shore. Comparing
nutrient constituents in surface water samples taken from the HDF site and the
agricultural ditches down gradient to nutrients sampled in the nearshore ocean
water revealed that indicator bacteria were substantially lower in the ocean than in
the ditch. The rapid decrease is likely a result of both physical mixing of water
masses and toxicity from saline water. In any event, the elevated levels of indicator
bacteria do not extend beyond the shoreline. Baseline water quality data and the
surface and marine water impact report is included in the Draft EIS as Appendix F.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and
surface water interaction with the marine water downgradient from the dairy site
was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the
Waiopili Ditch provides the majority of freshwater input in the immediate coastal
area. Water chemistry measurements made by MRCI identified mixing of ditch
water occurs rapidly and within a short distance of the shoreline.

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potential nutrient throughput from HDF. Phosphorus for both domestic wastewater
and landscape fertilization in the region is estimated to be 1,260 pounds annually,
or 1.4 times greater than the potential discharge from HDF. The nutrient inputs
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mitigation is applied to reduce the quantities.

The groundwater engineer estimated potential nutrient pass-through to
groundwater from the HDF nutrient budget at two percent of nitrogen (totaling
10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per
year). Again, this nutrient run-off would not occur as chronic daily release, rather,
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inches. Such rainfall events are estimated to occur approximately three percent of
days, or an average of 10 days annually. Per best practices, no effluent application
would be conducted during such weather events.

The groundwater and surface water analysis conducted for the Environmental
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times more nutrients than groundwater, due to the poor permeability of the
alluvium. Groundwater can discharge from the alluvium when it rises in wetter
periods and intersects the deep drainage ditches. Such discharge to the channels
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Sandy Macdougall
May 26, 2016
Page ͺ of 9

Sandy Macdougall
May 26, 2016
Page 7 of 9


monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai‘i Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Stuart & Lynne Maple:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S.
Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to reduce discharge of pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows' primary nutrition source and minimizes stress to the animals. cows tend to feed, walk, and exercise while they forage.

Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system. HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agriculture, an Alliance of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.1. The pastoral rotational-grazing dairy provides a local feedstock - grass – as the herd’s primary food source. Reducing imported feed costs and providing a sustainable feed supply are important to HDF’s operation. The animals are managed in social groups to benefit. The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed costs and providing a sustainable feed supply are important to HDF’s operation. The animals are managed in social groups to benefit. The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.
Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawaii with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a heifer/mature dairy cow. For more information on off-site herd management, refer to Section 3.3 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

**FLORA AND FAUNA:**

Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AEOS Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened, or proposed for listing under Federal or the State of Hawaii’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization.

No long-term impacts to native plant habitats or endangered or threatened plant species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhā‘ulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kauai may overfly the site. The endangered Hawaiian goose, nēnē as was also seen on the site, State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kōloa area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to project-associate with animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

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It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

**PESTS:**

A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā‘ulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for investigation. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent cleanup and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila musophila, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-‘ōhi‘a forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate
material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanic by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.3 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

In the Kōloa-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ahí Kinoiki Road between Kōloa and Po‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animals wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimāne volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is beneath the thick alluvium that covers the valley floor; and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material.
groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kauai community.

Regional Water Demand: The adjacent, developed Kīloa-Po‘ipu region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kauai will increase county-wide by 17,300 residents by 2030. The South Kauai population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kauai region (the Kīloa - Po‘ipu - Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data; however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a ‘Sanitary Survey’ of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a ‘Sanitary Survey’, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, US. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the National Resources Conservation Service (NRCS). These practices include setbacks to reduce the potential of soil erosion to surface waters. Powers will be erected 35-feet from the top of the drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageway; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the
potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kūkua-Pūiʻipu region were also calculated. Nitrogen input to the marine environment in the Poʻipu region is calculated to be 38,510 pounds annually, or 35 times more than the estimated potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipu region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipioi ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measured from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.
using atmospheric dispersion modeling system (AERMOD), the rates were scaled to
the size of the non-pasture areas used by cows at HDF. Results were added to the
background concentration of particulate matter (both PM$_{10}$ and PM$_{2.5}$) measured on
the island of Kaua‘i, and the total concentration was compared to the State ambient
air quality standards. Only the contemplated herd size of up to 2,000 mature dairy
cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust
impact would be negligible. The estimated concentration for PM$_{10}$ is 2.01 μg/m$^3$,
well below the State standard of 150 μg/m$^3$. The estimated concentration for PM$_{2.5}$
is 0.23 μg/m$^3$, well below the Federal standard of 35 μg/m$^3$ (see Draft EIS Section
4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of
organic matter in manure. No animals or dairy facilities currently exist in the area
leased by HDF, so air dispersion models were used to determine potential odor
levels. Local weather data was used in conjunction with the AERMOD modeling
system, and published rates for manure odors emissions for dairy heifers and
effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture
fields, irrigation water containing diluted nutrients from effluent, the effluent
storage ponds, and the dairy buildings. Odor rates from published research were
applied. Odor isopleths (a line used to map all points having the same numerical
value) were created to display the model findings. Odor is described in "odor units"
at the threshold of perception, which is defined by the point at which 50 percent of
panelists, in laboratory conditions, cannot smell the odor but 50 percent of the
panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low
wind velocity / mixing). Generally, tradewinds will disperse odors to less than
detectable levels beyond the HDF site; in periods of no wind, odor may not be
dispersed creating the “worst case” scenario. In these periods without normal
tradewind flow, the odor plume would extend to the south of the HDF site. Sections
4.19.2 and 4.25.2 of the ES include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may
be detectable by 50 percent of the sensitive population once per 200 hours, or 44
hours per year, within an area that extends approximately 1,670-feet (within one-
third of a mile) beyond the dairy farm boundary, and does not reach recreational or
residential areas. Results for the contemplated expanded herd size of up to 2,000
mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF
boundary (just over half a mile), again not reaching recreational or residential areas,
and again with detection limited to 50 percent of the sensitive population
approximately 44 hours per year. The parameters used in the analysis were
intentionally conservative, and the impacts shown assume an unlikely confluence of
worst-case meteorological data, irrigation location, and grazing location. Actual
offsets odor impacts are likely to be much lower and/or less frequent than shown; it
is likely odor detection beyond the HDF boundaries will be less frequent.

ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could
attain the objectives of the action’s purpose and need, and were compared with
environmental benefits, costs, and risks of each reasonable alternative against those
of the proposed dairy project. Further discussion of alternatives can be found in
DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s
purpose and need, and compares environmental benefits, costs, and risks of each
reasonable alternative against those of the proposed action. Additionally,
reasonable land use alternatives that emerged from public input during the project
scoping phase are documented and briefly discussed. The alternatives that do not
meet the project purpose are not advanced for analysis of environmental benefits,
costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative
Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could
attain the objectives of the action, regardless of cost. There is no requirement for the
alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed.
Resuming the land for resort or residential development, or a potential conservation
condemnation are two uses that were examined and eliminated from analysis.
These options would not be reasonably viable given the existing private land tenure
and existing zoning. Two additional alternatives were considered as reasonable land
uses as they could be permitted within the existing State Land Use Agricultural
District and County Agricultural Zoning District. These options include Agricultural
Park with Processing Center, and development of an Agricultural Subdivision.
The alternatives were examined and eliminated from further analysis, however, as they
would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose.
Rigorous exploration and evaluation of the environmental impacts of the
alternatives, including those that might enhance environmental quality or avoid,
reduce or minimize some or all of the adverse environmental effects, costs and risks.
These alternatives include: (1) the development of a Conventional Feedlot Dairy (a
non-pasture-based dairy) at the same location; (2) development of the Pasture-
Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing
by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of
potential alternatives, including the two alternative development scenarios.
Although the alternatives are potentially reasonable uses under existing zoning
and neighboring uses, each fails to comprehensively fulfill the project requirements
defined by the eight Project Objectives and the four established Evaluation Criteria
(Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in
the following statements.
Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).

None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).

The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.

Finally, addressing the range of potential environmental impacts (natural, cultural, social, and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Aloha HDF and EPO,

I am a resident of Kauai and would like my comments to be considered regarding the Dairy Farm in Poipu.

Location: Maha'ulepu is one of the most scenic and untouched places left on the island. The State spends lots of money marketing Poipu as an upscale sunny destination. I don't feel a Dairy Farm is suitable in this area. Isn't there another site better suited for a Dairy Farm? It will do great harm to the island's economy if the East side of Poipu becomes known as the stinky side of Poipu. Haven't we been focusing on developing and promoting the cultural aspect of Old Koloa Town and Poipu?

Smell: I am very familiar with farms, and Dairy Farms are impossible to breath around. When I visit friends on the mainland, both grass fed and feed lot farms are problematic. I hold my breath for over 4 miles when driving by them.

Rain: I have been through some wild rain seasons, 40 days and 40 nights one year. Even relatively small storms create brown water run off for days. I have deep concerns about run off from a Dairy Farm. Additionally, I have volunteered for school children outings in the beautiful Maha'ulepu area. Kauai has precious underground water near the Maha'ulepu Sink Hole. It is of utmost concern that Kauai cares for and protects this sacred area.

Sustainability: I believe there was a Dairy Farm on Kauai that is no longer running. Why did that Dairy Farm shut down? If we can process the milk on Kauai, how will it be profitable or sustainable if we have to ship the milk off island?

Gestation: I realize the dairy cows must be pregnant in order to lactate. How long is the gestation period for Dairy Cows and what is done with all the off-spring? 600 Dairy Cows = 600 Calves. In short order won't the cow population increase significantly?

I hope you can address our concerns. Once you establish a Dairy Farm, it will be very difficult to turn back and repair any unforeseen damages.

Sincerely

Marianne Martin
2167B Kelikoli Street
Lihue, Hawaii 96766
The term “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source nearer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off of the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and DnR EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lastate milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for the first 72 hours of their life. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kauai to be raised off-site. The committed herd size of
699 mature dairy cows at the Māhā‘ulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds' welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

NATURAL HAZARDS: The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards. The Māhā‘ulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai‘i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone. The Kaua‘i and Ni‘ihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands. Although they occur infrequently, Kaua‘i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhā‘ulepū region during and following the hurricanes that affected Kaua‘i in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhā‘ulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua‘i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. This direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i. The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. Ongoing dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to ongoing dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $60,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be
produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $0,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $60,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Nāpali formation lavas of the Wai‘anae volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor; and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the

unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 105 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day.

Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater bodies in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow
comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-end of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags, barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a Sanitary Survey of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations: Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic needs of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and
a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūalepā will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Pōʻipū region were also calculated. Nitrogen input to the marine environment in the Pōʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pōʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment**

An assessment of groundwater and surface water interaction with the marine water downslope from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring**

Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kauaʻi community.

**AIR QUALITY**

As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft IS Appendix I.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

**DUST**

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dried and compacted manure throughout the day. Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grading system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.
Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM\textsubscript{10} and PM\textsubscript{2.5}) measured on the island of Kaua'i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM\textsubscript{10} is 2.01 µg/m\textsuperscript{3}, well below the State standard of 150 µg/m\textsuperscript{3}. The estimated concentration for PM\textsubscript{2.5} is 0.23 µg/m\textsuperscript{3}, well below the Federal standard of 35 µg/m\textsuperscript{3} (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odor would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawaii Dairy Farms". [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
February 21, 2015

Attn: Laura McIntyre (808) 586-4337
State of Hawaii, Department of Health
1250 Punchbowl Street,
Honolulu, HI 96813

State of Hawaii, Department of Health
919 Ala Moana Blvd room 312
Honolulu, HI 96814

Laura McIntyre, Environmental Planning Office

Hawaii Dairy Farms, LLC.
P.O. Box 1690
Koloa, Hawaii 96756-1690

Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, HI 96813
Jeff Overton, Principal Planner

Comments to be considered in preparation of an Environmental Impact statement for:
Project Name: Hawaii Dairy Farms
Island: Kauai
District: Poipu
TMK: (4) 2-9-003:001 (portion); 006 (portion)
(4) 2-9-001:001 (portion)

To whom it may concern,

The following is my response and comment to the Hawaii Dairy Farms EISPN, posted on January 23rd, 2015. Each of the comments below need to be included and fully addressed by the Hawaii Dairy Farm EIS due to the substantial adverse environmental impact likely to be sustained if an Industrial Dairy is allowed to operate at Mahanaulepu or Kauai:

There are at least three County Wells (F, C, and D— in order of proximity) dangerously close to the proposed farm property that would be covered by planned land applied waste from grazing cattle as well as pumped de-sludge waste residue. These three wells provide the potable water for all of Poipu and most of Koloa. Well F, the nearest, is less than 750 ft. from Block H, a parcel specifically designated for receipt of pumped de-sludge residue. When this same area is actively grazed by cattle (HDF’s Plan identifies specific grazing paddocks at this same site), there will be no less than 100,000 lbs of wet manure, and at least 6,000 gallons of urine applied to and left on this site each day.

Unfortunately, this same area happens to contain some of the best draining soil of the farm site (as per NRCS Study and HDF’s latest Plan). Consequently, the migration of both bacteria and harmful nitrates into the wells is a certainty. The EIS needs to establish how this can be prevented.

Conclusion Not only does the EIS need to address the foregoing, but its EISPN is notably deficient in its proposal to consider Alternative Locations. In fact, HDF’s idea of alternatives is to consider taking no further action at the proposed site, operating a CAFO at the same site, or finding one other potential site. If HDF approaches the EIS process using the methods commonly followed during an EIS process, alternatives should encompass consideration of more than one other location at which their proposed plan could proceed if necessary.

In this case however, HDF has preselected a very limited alternative consideration and the single alternative site, not yet identified, is inadequate to satisfy the intent of the EIS process. It is interesting to note that when discussing the one alternative location in their EISPN, HDF states, “The micro-climate requires soil conditions favorable for nutrient absorption with access to a reasonable priced irrigation water source, to sustain nutritious grass pastures.” The EIS needs to address how HDF could possibly proceed at Mahanaulepu when both the NRCS and their own Iowa Based Soil Study indicate that the soils there are anything but “favorable for nutrient absorption.” HDF needs to solidly refute the obvious conclusion that the sensitive ecosystem of Mahanaulepu would be irreparably harmed if their Industrial Dairy is allowed to proceed as proposed.
Dear Jeff and Deborah Masters,

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai'i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua'i to produce fresh, locally available nutritious milk for Hawai'i families. The rotational-grazing method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S.
Environmental Protection Agency

May 26, 2016

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system. The term “grass-fed” was used in the HDF EISP. This term was used to identify the grazing management and grass-based diet that would support sufficient yield and nutrition to supply a portion of the dairy herd's diet. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient yield and nutrition to supply 70 percent of the herd's primary feed source. Reducing imported feed reduces costs and provides a more sustainable source of feed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to graze on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the distance cows must be moved on off of the farm. To protect the high quality of the hay and pasture, rotational grazing, strip grazing and buffer strips are used to reduce erosion, improve soil fertility and increase root and above-ground biomass. The number of cows is managed to ensure adequate plant residue, maintaining the required soil moisture and nutrient balance.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent. Irrigation water supply is provided to the farm from Waita Reservoir, and will be supplied by pivots that can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm. The irrigation system is designed to increase water use efficiency and improve water quality. The irrigation water system is controlled using computer software and GPS receivers to allow for real-time feedback and improved management of irrigation systems. The irrigation system is designed to increase water use efficiency and improve water quality. The irrigation water system is controlled using computer software and GPS receivers to allow for real-time feedback and improved management of irrigation systems.

The pastoral rotational-grazing dairy provides a grass-based diet that supports sufficient yield and nutrition to supply 70 percent of the herd's primary feed source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient yield and nutrition to supply 70 percent of the herd's primary feed source. Reducing imported feed reduces costs and provides a more sustainable source of feed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

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the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within the Ma‘ili Valley are connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material at the proposed dairy site is connected with the deeper groundwater of the Mau‘uma‘u Volcanics. In each of these studies, there is no hydraulic connection between the two waterbodies. Section 4.4.6 of the Draft EIS provides more detail.

Water QUALITY: Technical, computer-based, field studies and analyses on impacts from the proposed Hawai‘i Dairy Farms (HDF) operations. Evaluation conditions for treatment of high mineral content showing high quality. Baseline data on water quality for both groundwater in the alluvium and shallow aquifer, which may extend to considerable depths. The alluvial material is a soft, thoroughly decomposed rock. The alluvium, which generally extends about 60 feet under the surface and is underlain by unweathered volcanics, which generally extends about 60 feet under the surface and is underlain by unweathered volcanics. The hydraulic conductivity of the alluvium ranges from 10.5 – 50 feet per day. The hydraulic conductivity of the shallow aquifer is 0.001 – 0.005 feet per day. The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within the Ma‘ili Valley are connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material at the proposed dairy site is connected with the deeper groundwater of the Mau‘uma‘u Volcanics. In each of these studies, there is no hydraulic connection between the two waterbodies. Section 4.4.6 of the Draft EIS provides more detail.

Animals in various stages of lactation and gestation will be transferred between HDF and the existing Koko Koa Dairy based on their individual needs or desires to benefit both the dairy and cattle. Male calves will become part of the beef cattle herd; heifers (young female calves that haven't given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within the Ma‘ili Valley are connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material at the proposed dairy site is connected with the deeper groundwater of the Mau‘uma‘u Volcanics. In each of these studies, there is no hydraulic connection between the two waterbodies. Section 4.4.6 of the Draft EIS provides more detail.
Regional Water Demand: The adjacent, developed Kōloa-Poʻipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kauaʻi will increase county-wide by 17,300 residents by 2030. The South Kauaʻi population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kauaʻi region (the Kōloa - Poʻipū - Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed. The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hoʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile fabric and sediment logs around drain inlets.

Surface Water Quality: The Kauaʻi Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawini Cave Reserve in April of 2014. The group reported high levels of Enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands. Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HFD received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HFD operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to capture particulates and nutrients during stormwater events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from EFFluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 670 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to
increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totalling 10,000 pounds per year), and one percent of phosphorus (totalling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kāloa-Pōpū area were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downstream from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiʻōpili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperse inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and...
neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).

None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities (Criterion 3).

However, after years of trying, it appears there was limited interest in such a venture.

- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability and accessibility (Criterion 1).

- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
There are so many negative factors involving the proposed Dairy Farm on Grove Farm land in Poipu that it is hard to just pick out the worst. The whole tenor of this this is negative and the performance at Koloa School shows how wrong and how foreign this company is for Kauai. They have no idea of Kauai Style. Bringing security people, refusing questions that are not pre-approved, and basically just presenting a marketing campaign.

However, what is so discouraging to me is that the DOH is allowing a fake EIS from these people. It is not a legitimate EIS as it is being done by the same people on the payroll who are designing the project. The DOH is not supposed to be a political arm of the government, but one that protects the island's people. Yet, they fail again & again to do that. One example is that although volunteer organizations constantly test our local waters and find them polluted, the DOH often finds no pollution. Who do we believe? Now, because our mayor is development oriented, and unfortunately, the governor I voted for also seems to be going that way, we can expect them to approve this phony EIS. Dr. Bal, you have done so much for Kauai - please do not let these intruders ruin a very precious resource. Please insist this billionaire not call the propaganda they are working on a legitimate EIS. They say they are doing it voluntarily, so I guess that justifies their doing it in-house so to speak.

If they were attempting to do the right thing, they would go thru mediation and have the mediator choose an unbiased company to prepare a legitimate EIS. They say they are doing it voluntarily, so I guess that justifies their doing it in-house so to speak.

Money talks and we the people believe politicians all have their hands out. Billionaires can get whatever they want. How sad for our Nani Kauai.

Candace McCaslin

Sent from my iPad

---Original Message---
From: Candy McCaslin (mailto:cmccaloha@gmail.com)
Sent: Monday, February 23, 2015 5:32 PM
To: EPO
Subject: Mahalepuu

Mahalepuu
There are so many negative factors involving the proposed Dairy Farm on Grove Farm land in Poipu that it is hard to just pick out the worst. The whole tenor of this this is negative and the performance at Koloa School shows how wrong and how foreign this company is for Kauai. They have no idea of Kauai Style. Bringing security people, refusing questions that are not pre-approved, and basically just presenting a marketing campaign.

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If they were attempting to do the right thing, they would go thru mediation and have the mediator choose an unbiased company to prepare a legitimate EIS. As was done with the GMO folks. Money talks and we the people believe politicians all have their hands out. Billionaires can get whatever they want. How sad for our Nani Kauai.

Candace McCaslin

May 26, 2016

Candace McCaslin
cmccaloha@gmail.com

Subject: Hawai'i Dairy Farms

Environmental Impact Statement Preparation Notice
Mahalepuu Road
Kaua'i, Hawai'i
TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Candace McCaslin:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

Your comments were received by the State of Hawai'i Department of Health Environmental Planning office. The Department of Health forwarded a copy of your comments to Group 70 International in order to be included in the Draft Environmental Impact Statement (EIS) analysis. This letter was prepared in response to your comments.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

GROUP 70 OBJECTIVITY: Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai'i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai'i Revised Statutes and the “Environmental Impact Statement Rules” (Chapter 200 of Title 11, Hawai'i Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has
been accepted by the responsible County, State and Federal agency. On numerous material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaii’s Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlors and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be grazed. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and in the deep aquifer were documented. Future monitoring will allow the comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kaliheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silt clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic
visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Several controls to be utilized during construction will include: silt fence installed in key locations; sand barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makuawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB did not conduct water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received construction and/or exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.
The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīlauea-Pu‘ipū region were also calculated. Nitrogen input to the marine environment in the Pu‘ipū region is calculated to be 36,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pu‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipōli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawai‘i Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
An Environmental Impact Statement (EIS) is being prepared voluntarily by the Applicant to assess potential environmental impacts and mitigation measures associated with agricultural operations at Hawai‘i Dairy Farms (HDF) at Māhā‘ulepū, Kaua‘i.

To assist in preparing the EIS, an Environmental Impact Statement Preparation Notice (EISPN) was recently published. A 30-day public comment period on the EISPN ends February 23, 2015. The purpose of the publication and comment period are two-fold:

1. To allow individuals and groups to request to become a consensual party; and
2. To provide written comment regarding effects of the proposed action.

NOTE: Submitted comments will be published in the Draft EIS

**COMMENT**

**Name:** Sharon McCoubrey  
**Organization:** Homestead Dairy  
**Preferred contact Method**  
**Email:** smccoubrey@aoa.hawaii.gov  
**Post Address:** P.O.Box 609 Kilauea Kauai 96756  
**Phone:** (Optional)

**Comments:**

*Why was this meeting necessary?*

All of the information needed was available to everyone who read the paper or listened to the presentation. We thought people you really didn’t know? An easy solution would to simply move the location to an area more suited to the dairy. Why to do it? To choose this location be passed (Homestead) ground to go waste to all we put high value on the land.

As a homeowner, you plans stuck! Please the put
May 26, 2016

Sharon McCoubrey
P.O. Box 607
Koloa, HI 96756
smcoubrey@me.com

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice

Dear Sharon McCoubrey:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

ARCHAEOLOGICAL AND CULTURAL: The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-29A. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with prehistoric and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic-era cultural materials associated with the many Land Commission Awards in the project area were nonexistent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhā‘ulepū Ahu’u’a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully endorsed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits,
costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffers between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawaii’s Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Ellen F. Meboe
1901 Poipu Road, K714
Koloa, HI 96756

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Ellen F. Meboe:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to groundwater and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to prop up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The
management practices and pasture model applied by HDF maximizing grass as the cows' primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawaiʻi is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kauaʻi to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāʻulepū site applies to mature mature dairy cows.

Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawaiʻi with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as hST or rBGH.

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest associated with cattle manure in the general Māhāʻulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kauaʻi with the HDF site include the house fly, the dog dung fly and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila musaphila, the only Kauaʻi species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koaʻa forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawaiʻi for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.
An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhā‘ulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pads in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōloa-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ah Kinoiki Road between Kōloa and Po‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animals wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plassch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pads in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

The potential of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plassch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

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The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including direct and indirect odor. Potential odors and emission levels for air pollutants related to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric
fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

**DUST**

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylot" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Placing The Hawaii Dairy Farm on Mahuaulepu will greatly affect the economic and social welfare of the Poipu community:

**Substantially affects the economic or social welfare of the community or State;**

**Substantially affects public health;**

**Curtails the range of beneficial uses of the environment (for plants, animals, or humans);**

**Involves a substantial degradation of environmental quality;**

**Detrimentally affects air or water quality or ambient noise levels;**

HDF’s EISP does not cover how the Dairy Farm will prevent the overwhelming stench of the urine and feces of 2,000 cows, carried by the trade winds, from engulfing the Poipu community. Nor do they address how they will prevent the massive numbers of biting flies that accompany said herd from multiplying and biting people in the vicinity of Mahuaulepu and Poipu.

We live in Poipu Kai. We will not be able to open our windows because of the terrible smell. We will not want to walk outside even to the small and biting flies. We will not invite our relatives and guests from the mainland to visit us anymore as Poipu will be a place to avoid. Our property values will plunge.

We moved here in 2010 to retire in paradise. No longer will Poipu be paradise. Tourists will not come here, thus many jobs will be no longer needed, from the housekeeping staffs to the restaurants and hotels.

Indeed, placing The Hawaii Dairy Farm on Mahuaulepu will greatly affect the economic and social welfare of the Poipu community. The concerns I have cited need to be addressed in the EIS.

Sincerely,

Joe Meboe
management practices and pasture model applied by HDF maximize grass as the primary feed source and result in healthier, more productive cows that are less likely to be moved off the farm. To protect the water quality of drains and on-farm waters, the majority of pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation system or through gun irrigators.

The pastoral rotational-grazing dairy provides a local feedstock—grass—as the herd’s primary food source. Reducing the need for imported feeds saves costs and provides a highly nutritious, high-quality diet. The feed management plan, encompassing pasture, seasonal growth, and genotype in the diet, provides an adequate source of plant nutrients and adds the following to cow diets:  corn silage, steam-flaked corn, and organic matter. HDF will continue to monitor the progress of the cow diets and will continue to adjust the diet as indicated by the individual and herd performance. The pasture-based model allows cows to move about freely, and to lie down and exercise while they forage.

Results of grass trials conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient grass production. The NRCS Conservation Practice Standard 590, Nutrient Management, applies to irrigation water. Nutrient management is the practice of managing the amount, rate, method of application, and timing of plant nutrients and soil amendments. The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation system or through gun irrigators.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will be highly unlikely that the storage pond will be full at any time for the proposed dairy operations that could pass through ground and surface waters. The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows. For more information on nutrient balance,
As an especially important insect to minimize fly breeding habitat in manure is the dung beetle. This beetle, which buries manure and incorporates it into the soil, is a key species in the natural process of manure decomposition. Populations of dung beetles, however, are affected by local conditions and can vary considerably. The HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, the reader should consult附录E.

PESTS: Flies were identified on the HDF site using a method familiar to neighboring livestock as bait for insects. The two flies associated with livestock are the stable fly and the horn fly. These pests are common in areas with high pet populations. It is possible that these fly species could be attracted to the site as they seek food sources. In addition, the HDF site includes the housefly, the dog dung fly, and the chicken dung fly. These pest species found on site is provided in EIS Section 4.11 and Appendix B.

Dung beetles are specialists in the very important natural process of manure decomposition. One to three days after the animal excreta is deposited, the dung beetle moves the material, burying it in the soil where it is incorporated, allowing for aeration and decomposition. The HDF project would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawaiian Island), approximately 10 percent of Hawaii's milk is locally produced. In 2015, carried milk annually, a 50 percent increase in statewide milk production. Ongoing dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time jobs. Additional 6 indirect jobs related to ongoing dairy operations would be created on Kaua'i.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of veterinary care. Dairy managers and caretakers will be trained and competent in handling milk and other dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time jobs. Additional 6 indirect jobs related to ongoing dairy operations would be created on Kaua'i.

In the Kaipara region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the area adjacent to the site, which provides fly pupae and flies. The HDF would provide habitat for flies in the vicinity of the site, and it was determined that the flies in the vicinity would not significantly affect recreational and arterial areas.

Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animal waste within the area. These mitigation activities must address any increase in population, therefore it is expected that the increase of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of manure decomposition. One to three days after the animal excreta is deposited, the dung beetle moves the material, burying it in the soil where it is incorporated, allowing for aeration and decomposition. The HDF project would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawaiian Island), approximately 10 percent of Hawaii's milk is locally produced. In 2015, carried milk annually, a 50 percent increase in statewide milk production. Ongoing dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time jobs. Additional 6 indirect jobs related to ongoing dairy operations would be created on Kaua'i.
HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double the milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For ongoing operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy feeders and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

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detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Ira & Rayme Meyer
1660 Pe'e Road
Koloa, HI 96756
rayme_meyer@hotmail.com

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Mā'ahāulepū Road
Kaua'i, Hawai'i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Ira & Rayme Meyer:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai'i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Mā'ahāulepū Valley on the island of Kaua'i to produce fresh, locally available nutritious milk for Hawai'i families. The rotational-grazing method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 21, 2015, described the proposed pasture-based rotational grazing system

areas be mitigated. If mitigation is not possible, the project must not be allowed to advance. The EIS must include ALL factors not only from the beginning stated 699-head dairy but at full build-out.

Thank you for your attention to these issues.

We would like to be a consulting party, informed as the EIS process goes forward.

Ira and Rayme Meyer
Frequent users of Mā'ahāulepū.
Po'ipu Homeowners since 1986
1660 Pe'e Road, Koloa 96756
rayme_meyer@hotmail.com
irameyer@hotmail.com
as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP/N. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy heifers’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the heifers’ primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 65 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water: Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and DnR EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows last milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a proper start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of
Ira & Rayme Meyer
May 26, 2016
Page 4 of 17

699 mature dairy cows at the Māhāulepū site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

SOILS: Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during dryer periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawai‘i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soils Resource Report for Island of Kaua‘i, Hawai‘i.” The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kāhili Clay at 32 percent, Ka‘ena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline of soil salinity and fertility demands of the primary crop, Kikuyu grass. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai‘i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due...
to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

**ARCHAEOLOGICAL AND CULTURAL:** The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heliau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flame system during from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic era cultural materials associated with the many Land Commission Awards in the project area were nonexistent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhūʻulepū Ahupua‘a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trees, State Site 50-30-10-2250, the agricultural heliau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

**PESTS:**

A study of invertebrate species and pest insects was conducted by Steven Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle and cultural resources, with technical studies in Appendix G and H.

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**FLIES:** Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the dog dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11 and Appendix B.

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**PESTS:** A study of invertebrate species and pest insects was conducted by Steven Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhūʻulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua‘i and not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila musaphilia, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-‘ōhi’a forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which haries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhūʻulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pads in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kō‘a-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Alaka‘i Road between Kō‘a and Po‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized control to reduce pest populations need to address breeding sites in and amongst the food and animal wastes within the area. These mitigation
measures will make it difficult for flies to breed, and BMPs will be enforced to avoid any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

NOISE: Existing noise conditions of the project site and the surrounding Māhūlepū valley area are evaluated in the Draft Environmental Impact Statement (EIS), along with anticipated short-term and long-term noise conditions associated with the dairy farm and planned mitigation actions. Draft EIS Section 4.12 addresses noise conditions.

Noise can be defined as unwanted sound, a sound that is considered loud or unpleasant, and/or sound that causes disturbance. Research related to noise and livestock focuses on noise levels and minimization of unexpected sounds that cause undue stress on cows. Noise stress results in loss of livestock productivity and thereby financial loss to farmers and ranchers. Little research exists on the sound levels from livestock.

Sound is measured in decibels (dB). The State of Hawai‘i Department of Health (DOH) rules use the A-weighting sound network (dBA) in the HAR §11-46. Community Noise Control. Sound through the air is similar to ripples on a pond of water. In open space without reflection, ripples spread uniformly in all directions and decrease in amplitude further from the source. In free field conditions such as outdoors, amplitude drops by half as distance doubles (OSHA, 2016). When sound passes close to absorbing ground cover such as grassland and fields, the “soft ground” absorbs extra sound as it passes. The Hawai‘i Dairy Farms (HDF) site in Māhūlepū Valley is approximately 2 miles from the resort area, and 1.5 miles from the closest residential areas (on land zoned for agriculture). Typical noise currently generated near the HDF site includes truck ingress/egress along private farm roads, agricultural equipment, and cattle and sheep.

Construction work at the project site will involve activities that may generate an increase in noise levels. However, such exposures will be a short-term condition, occurring during daylight hours. Construction vehicles and activities must comply with DOH Administrative Rules. DOH noise control regulation requires a permit for construction activities that emit noise in excess of 78 decibels or that cost a total of more than $250,000. Mitigation measures to minimize construction noise will include the use of mufflers to suppress loud equipment and limitations on the hours of heavy equipment operation.

The dairy farm will utilize milking equipment contained in the milking parlor, and will use field equipment such as tractors. Under HAR §11-46, agriculture is classified as Zoning District Class C, which specifies maximum permissible sound levels of 70 dBA in the daytime and 70 dBA at nighttime. Dairy operations will generate noise in keeping with agricultural zoning of the parcel. The primary noise receptors in the area would be farmers working nearby parcels. Noise from the dairy will not exceed the DOH threshold, and will not contribute to excessive noise in the region.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plach Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 2,000 mature dairy cows, would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 2,000 mature dairy cows, would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied.

HDF is expected to generate a net income of approximately $60,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 44 million gallons (361,176,700 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $80,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total) versus $68,000 for the committed herd size. The State will derive approximately $260,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.
Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area’s hydrology is shaped by its geology. The Kīloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kīloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is barred beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kīloa-Poʻipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kīloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kīloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered alluvium and surface water bodies within Māhāʻulepū could be connected. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors, and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kīloa-Poʻipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2030, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kīloa - Poʻipū - Kalahē districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well.
water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha'upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāulepū Road. This ditch, named Waiopili Ditch, is joined by a stream from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment log around drain inlets.

**Surface Water Quality:** The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāulepū Valley. The dew pond along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations: Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemptions for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageway; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows. A supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter yield of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 423 of the Bay provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater; due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.
The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Pō'ipū region were also calculated. Nitrogen input to the marine environment in the Po'ipú region is calculated to be 38,510 pounds annually, or 35 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,250 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipú region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Wai'oli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditches. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua'i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act
Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai'i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST
Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua'i and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).
ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL:  http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

John W. Miller
1870 Hoone Road
Koloa, HI 96756

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i

Dear John W. Miller:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S.
Environmental Protection Agency related to concentrated feeding operations in the States. As noted previously, the HDF system is designed to utilize 100 percent of the healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. The irrigation system is controlled using computer software and GPS receivers to allow pivots to rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary feed source. Reducing imported feed stabilizes costs and provides a desired use of the waste. Reflected in the title of the livestock waste guidance found in Draft EIS Section 3.3.1, the term “grass-fed” is used to identify cattle raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups every 45 days, to ensure that the ponds are kept at manageable levels.

Cow lactate milk following the birth of calves. Newborn calves will be housed on pasture until they are approximately one week old, depending on the actual weather conditions. For more information on nutrient balance properties and weather conditions, see Draft EIS Appendix D. The rearing of calves is not addressed in this EIS.

The committed herd size of 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows, it is being used for the constituent components that provide" dry matter" grass yields essential to a cow’s diet. Additional project-specific trials conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varietie s of grass, and suitable sites to support sufficient dry matter yields. The results have identified sufficient yield and nutrient supply to support 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of irrigation water and downstream areas, paddock fences are set back 35 feet from the boundary of the site. The committed herd size of 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows, it is being used for the constituent components that provide" dry matter" grass yields essential to a cow’s diet. Additional project-specific trials conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varietie s of grass, and suitable sites to support sufficient dry matter yields. The results have identified sufficient yield and nutrient supply to support 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.
Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai'i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven't given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhūʻipū area, as well as the parasites and predators that control these species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often found together with the house fly Flies known to exist on Kaua’i but not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila maraphila, the only Kaua’i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation kaa-ʻūhā forests.

By populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.
HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double the milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

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Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlors. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Oдор emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Oдор emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

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detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

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This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Environmental Impact Statement Preparation Notice

An Environmental Impact Statement (EIS) is being prepared voluntarily by the Applicant to assess potential environmental impacts and mitigation measures associated with agricultural operations at Hawai'i Dairy Farms (HDF) at Māhāulepu, Kaua'i.

To assist in preparing the EIS, an Environmental Impact Statement Preparation Notice (EISP) was recently published. A 30-day public comment period on the EISP ends February 23, 2015. The purposes of the publication and comment period are two-fold:

1. To allow individuals and groups to request to become a consulted party; and
2. To provide written comments regarding effects of the proposed action.

NOTE: Submitted comments will be published in the Draft EIS

Continued

COMMENT

Name: Mary C. Wells Organization: 
Preferred contact Method Email: Postal Address: 
Phone: (Optional)

Comments: I lost Kaua'i with fire in my eye

to live on Mainland. For 10 months after Hurricane
Iki—when I'd be on Buses/9-11-1992 at Prison from
sink, the mud was washed away; the land to
rebuild—returned to Kaua'i July 1993. Found
2 acres living on Kaua'i. Before my rent was
$25 a month. After rent was $1,500 a year. Now
I am living in Naples, Fl. Took 4 yrs. Rent to Deserted
1987, I was humming Hummel, (yes!)

I was going to Hawaii 11-22-1987. But my house that I rented
in Honolulu, Kailua, Hi, for a 60 month mortgage
for $500.00 a week—And my 2 dogs friend I
went in the ocean—Note—friends in the
rebellion. Kaua'i where I lived was burned not green
I corresponded 5 30 AM Eye Open 1:00 in a
Cure 3:00 PM. (continued)

Return to:
Group 70 International, Inc.
923 Bethel Street, 5th Floor
Att: HDF Project
Honolulu, HI 96813
hd7@group70int.com

And/or:
Hawaii State Department of Health
Environmental Planning Office
919 Ala Moana Boulevard, Rm. 312
Honolulu, HI 96814
epo@doh.hawaii.gov

Deadline: February 23, 2015

I evacuated to Water Walk Trail—Punam
Not for from HDF proposed not sure
I was for enough money: my friends had
told me to stay. For winding from 9am 7:30
is to close for 6:00am. All was riding
that area. People injured—fever
Dear Sir. It is “unbearable” it will happen
again.

Only a few will be able to get thrown
the Tree Tunnel “Maluhia Rd.” I was blocked
for 2001 to 2002 last year 2014 for the
Marathon. With my 31 years I had never seen
the Tree Tunnel with people trying to leave Kaua'i
the road was bumper-to-bumper from Bogy
Bridge to Beginning of Tunnel. I had to
laugh. But I should be I easy to think what is
going to happen.

What about flooding? Raw Drinking Water?
On Kaua'i the water spot on earth I have
experienced 73 days of Rain Non-Stop 1988.
During 1989-1988. It ravaged
Kaua'i in Poihilo Kolea. Forain Some few years ago
2002-2007. We had another 40 Day Biblical rain
in a row it rains & windy in Kaua'i. So
even though we are in a drought now it means
we lose the people need clean water It does not belong
to Your Farm
Now, what will you do to control the smell? Chemicals you use in the air? What about the flies and rodents?

Feb 14 2014 I attended a non-profit farm "Life Bridge" seminar. Mahama Porl at Mano Kalawape Park, Porl. We washed our hands with soapy water. And then we pray. We all had heavy rain with the storm. The smell will kill the entire industry. More people will affect the economy. Devalue properties. Will be Kojama O Komolpana, just increased the value of property. We need to protect the area. The land with properties to benefit us in the long run. Not short time profit. Do you not care HOF about the 35 endangered species? From spiders, birds, Owls to sea creatures. We must eat wholesome. Running under bridges. What do you plan to do? The whole will be 'There should be a law' to take the law. Of course, it is just that has happened since 1878. 1980 for me.

All aging. The need to be addressed in the HOF. Schweitzer'sשעה. Take me back to my little quest. Shoshana.

Which are possible. [Handwritten notes]
May 26, 2016

Mary P. Mills
P.O. Box 1256
Kalaheo, HI 96741

Dear Mary P. Mills:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawaii’s precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai'i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhū'ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawaii’s families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with proposed dairy operations that could pass through to groundwater and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.5. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local food source – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhū‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob”, mimicking the natural social order of hovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The
Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and increase the effective milk production in Hawaii with a similar local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s well-being. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with breast growth hormones, referred to as BST or rBGH.

NATURAL HAZARDS: The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhāʻulepū property is not known to experience flooding conditions. The area is located within the Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai`i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone. The Kaua`i and Ni`ihau region of the Hawaiian Islands have experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands.

Although they occur infrequently, Kaua`i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhāʻulepū region during and following the hurricanes that affected Kaua`i in 1982 and 1992 observed deforestation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhāʻulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds...
regulatory requirements, with containment in excess of the major rainfall events recorded on Kauai over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCA, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

ARCHAEOLOGICAL AND CULTURAL The Hawaii Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic era cultural materials associated with the many Land Commission Awards in the project area were non-existent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bone was found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhāʻulepū Valley area has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully endowed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

FLORA AND FAUNA Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened or proposed for listing under Federal or the State of Hawaiʻi's endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plants species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhāʻulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kauai may overlap the site. The endangered Hawaiian gooses, nēnē was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests
The principal potential impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include: propping construction cranes at night, using conservation fencing to project specified areas, marking all structures and fencing with white visibility polytype, limiting nighttime lighting, and shading any outside lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in EIS Section 4.18.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

Hydrology: The area's hydrology is shaped by its geology. The Kōaua area was built by Napali formation lavas of the Wainee volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as much as 400 feet below sea level. Weathered lava in the area is typically saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a depth of 100 feet. The alluvial material consists of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor; and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley

and the HDF site ranges from 0.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōaua-Poipu region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōaua F well will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well. Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōaua F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.
Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kali‘ōkea districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fail under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particular during stormwater events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 670 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to
increase more than three tons DM per acre with dairy establishment, from the
current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS
provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepī will carry three
times more nutrients than groundwater, due to the poor permeability of the
alluvium. Groundwater can discharge from the alluvium when it rises in wetter
periods and intersects the deep drainage ditches. Such discharge to the channels
could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to
groundwater from the HDF nutrient budget at two percent of nitrogen (totaling
10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per
year). Again, this nutrient run-off would not occur as chronic daily release, rather,
the runoff contributions would be limited to periods of the major rainfall over 0.8
inches. Such rainfall events are estimated to occur approximately three percent of
days, or an average of 10 days annually. Per best practices, no effluent application
would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Poʻipū region were
also calculated. Nitrogen input to the marine environment in the Poʻipū region is
calculated to be 38,510 pounds annually, or 35 times more than the estimate of
potential nutrient throughput from HDF. Phosphorus for both domestic wastewater
and landscape fertilization in the region is estimated to be 1,260 pounds annually,
or 1.4 times greater than the potential discharge from HDF. The nutrient inputs
from domestic uses in the Poʻipū region are constant throughout the year and no
mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and
surface water interaction with the marine water downgradient from the dairy site
was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the
Waipōpu Ditch provides the majority of freshwater input in the immediate coastal
area. Water chemistry measurements made by MRCI identified mixing of ditch
water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just
days annually from dairy operations will not adversely affect ocean water quality
and the marine environment. The nearshore area is a highly mixed environment
which actively disperses inputs within several meters from shore. Comparing
nutrient constituents in surface water samples taken from the HDF site and the
agricultural ditches down gradient to nutrients sampled in the nearshore ocean
water revealed that indicator bacteria were substantially lower in the ocean than in
the ditch. The rapid decrease is likely a result of both physical mixing of water
masses and toxicity from saline water. In any event, the elevated levels of indicator
bacteria do not extend beyond the shoreline. Baseline water quality data and
the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality
monitoring will be instituted in conjunction with the surface water quality
monitoring to regularly sample and analyze the nearshore ocean waters. The
ongoing testing program will provide feedback to the dairy management team to
help ensure that nutrients and bacteriological constituents are not being released at
levels of environmental concern. Data from the nearshore water monitoring
program will be shared with the DOH CWR, dairy neighbors and the local Kauaʻi
community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air
quality conditions and project impacts were evaluated, including dust and odor.
Potential odors and emission levels for air pollutants relevant to dairy operations
were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25
provide an evaluation of air quality and odors, including a windrose depicting wind
speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality
technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S.
Environmental Protection Agency (EPA) regulates both large and small sources of
air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for
six criteria pollutants. The State of Hawaiʻi has established its own State Ambient Air
Quality Standards (SAAQS) that are as strict or, in some cases more strict than the
NAAQS. State standards prohibit any visible emissions of fugitive dust from
construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive
dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric
fermentation, and both methane and nitrous oxide (N2O) emissions from manure
application. No State or Federal regulations for greenhouse gas emissions from farm
operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect
the paddocks and lead to and from the milking parlor. Potential fugitive dust
emission rates were estimated from published literature, where particulate matter
(PM) is measurable from the "drylots" of confined dairy operations where animals
walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates
potential emission resulting from HDF. Cows in the pastoral rotational-grazing
system will be on pasture 22 hours each day and will spend two hours – in two
separate milking cycles – moving to and from the barn for the 10- to 15-minute
milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to
the size of the non-pasture areas used by cows at HDF. Results were added to the
background concentration of particulate matter (both PM$_{10}$ and PM$_{2.5}$) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM$_{10}$ is 2.01 μg/m$^3$, well below the State standard of 150 μg/m$^3$. The estimated concentration for PM$_{2.5}$ is 0.23 μg/m$^3$, well below the Federal standard of 35 μg/m$^3$ (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670 feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawaii Dairy Farms”: [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Imogene Miner:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. Your comments were received by the State of Hawai‘i Department of Health Environmental Planning office. The Department of Health forwarded a copy of your comments to Group 70 International in order to be included in the Draft Environmental Impact Statement (EIS) analysis. This letter was prepared in response to your comments.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and...
The pasture-based model allows cows to move about freely, to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups for 14 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy-facility surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The primary nutrition source for the animals is grass. Grass is the most nutrient-dense feeds available, and cows require the highest quality feed for the best health and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the cow's primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

Irrigation water supply is provided to the farm components. The farm will be filtered and pumped to the various irrigation components on the farm. The irrigation system and distribution of livestock water will be monitored on a regular basis. Irrigation water supply is provided to the farm components. The farm will be filtered and pumped to the various irrigation components on the farm. The irrigation system and distribution of livestock water will be monitored on a regular basis.

The term "grass-fed" was used in the HDF EIS. This term is not used in this EIS. The term is used to identify pastures-based rotational grazing systems. The term "zero-discharge" under the U.S. Environmental Protection Agency related to concentrated feeding operations for the dairy farm is described in Chapter 3. As noted previously, the HDF system is designed to utilize 100 percent of the cows' primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

HDF elected to discontinue use of the term "zero-discharge" as it was not used in this EIS. Therefore, HDF elected to discontinue use of the term "zero-discharge" as it was not used in this EIS. The term "grass-fed" was used in the HDF EIS. This term is not used in this EIS. The term is used to identify pastures-based rotational grazing systems. The term "zero-discharge" under the U.S. Environmental Protection Agency related to concentrated feeding operations for the dairy farm is described in Chapter 3. As noted previously, the HDF system is designed to utilize 100 percent of the cows' primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

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Irrigation water supply is provided to the farm components. The farm will be filtered and pumped to the various irrigation components on the farm. The irrigation system and distribution of livestock water will be monitored on a regular basis.
Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāʻulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (DEIS), including a fiscal impact analysis report completed in April 2016 by Plac3 Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, movers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $80,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāʻulepū Valley floor is filled with...
Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F-Well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and the aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlors and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hā‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāulepū Road. This ditch, named Waiopīlī Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction
Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data; however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from exiting agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 1.62 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,360 pounds annually, or 14 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal...
area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline. The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Lance C. Mizumoto

Subject: Hawai’i Dairy Farms
Environmental Impact Statement Preparation Notice

Māhā’ulepū Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Lance C. Mizumoto:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the direction of HDF management, the herd size may increase up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waima‘a volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā’ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā’ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day.

Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā’ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i’s Department of Health Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā’ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā’ulepū 14 well and the County’s Kōloa F-1 well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.
Though the waterbody in which the County well occur is confined and hydrologically separated from shallow groundwater, exposure of disturbed surfaces; monitoring and repair of structural controls; and establishment of a 1,000-foot setback to protect water resources are included in the Surface Water section. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional practices are anticipated to fall under the exemption for construction or development of new water systems. The HDF site is located on the bottom of drainageway (totaling 70 feet in width) to keep cows away from surface waters. Maintenance of existing or new animal walkways, stream crossings, and farm roads creates filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water-quality standards for activities that might affect the waterway drainage system. Long-term operations, setbacks and buffers: Normal ongoing farming and ranching practices are anticipated to fall under the exemption for construction or development of new water systems. These regulations are intended to prevent pollution and protect water quality. The HDF site is located on the bottom of drainageway (totaling 70 feet in width) to keep cows away from surface waters. Maintenance of existing or new animal walkways, stream crossings, and farm roads creates filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by the State Department of Health to monitor baseline water quality. Baseline data on water quality for both groundwater and shallow waters in the alluvium area were collected. Baseline monitoring will allow the monitoring program to be shared with the Department of Health Clean Water Branch, and the data will be used to evaluate the impact of activities that could affect water quality. The HDF site is located on the bottom of drainageway (totaling 70 feet in width) to keep cows away from surface waters. Maintenance of existing or new animal walkways, stream crossings, and farm roads creates filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways.

**Regional Water Demand:** The State Department of Economic Development and Tourism projects that the Kauai Chapter of the Surfrider Foundation began monitoring regional water demand in 2011. The group reported high levels of activity in the Waipio Valley, which is a key location for surfing activities. Additional practices are anticipated to fall under the exemption for construction or development of new water systems. The HDF site is located on the bottom of drainageway (totaling 70 feet in width) to keep cows away from surface waters. Maintenance of existing or new animal walkways, stream crossings, and farm roads creates filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways.

**Water Hydrologic Unit:** The Waipio Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The HDF site is located on the bottom of drainageway (totaling 70 feet in width) to keep cows away from surface waters. Maintenance of existing or new animal walkways, stream crossings, and farm roads creates filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be located within the Watershed Protection District of the Haupu-Kealia Stream and contribute to the existing water quality. The HDF site is located on the bottom of drainageway (totaling 70 feet in width) to keep cows away from surface waters. Maintenance of existing or new animal walkways, stream crossings, and farm roads creates filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways.

**Pollution Prevention Plan (SWPPP):** A Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES). The SWPPP will be employed to control stormwater runoff. The HDF site is located on the bottom of drainageway (totaling 70 feet in width) to keep cows away from surface waters. Maintenance of existing or new animal walkways, stream crossings, and farm roads creates filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways.

**Sanitary Survey: The HDF site is located on the bottom of drainageway (totaling 70 feet in width) to keep cows away from surface waters. Maintenance of existing or new animal walkways, stream crossings, and farm roads creates filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways.
only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.  

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment:** An assessment of groundwater and surface water interaction with the marine water downstream from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively dispenses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kauaʻi community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: search "Hawaiʻi Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

GROUP 70 INTERNATIONAL, INC.
May 26, 2016

Yuri Montgomery
2211 B Pane Road
Koloa, HI 96756
ymontgomery@comcast.net

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-003: 001 portion

Dear Yuri Montgomery:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system.
as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S.
Environmental Protection Agency related to concentrated feeding operations
(CAFOS) is a system designed to not discharge pollutants into waters of the United
States. As noted previously, the HDF system is designed to utilize 100 percent of the
cows’ manure on-site. However, nutrients would be introduced to the HDF site with
any use; the Draft EIS identifies the amount of nutrients anticipated from the
proposed dairy operations that could pass through to ground and surface waters.
Therefore, HDF elected to discontinue use of the term “zero discharge” as it was
construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify
HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70
percent of the dairy herd’s diet. In January 2016, the U.S. Department of
Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-
fed”. The USDA standard defines what animals can and cannot be fed. The Food
Alliance, a project of several northwest colleges, believes that when consumers
choose grass-fed products there is an expectation that these will come from animals
raised on pasture on a forage-based diet. Due to the evolving definition of “grass-
fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western
boundary of the site. The developed area “footprint” will be less than 2 percent of
the total farm area. Four buildings will be constructed to serve different functions,
supported by utilities and infrastructure. Additional building information can be
found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will
include storage tanks and silos, effluent storage ponds, livestock water systems, and
drainage improvements. The irrigation system and distribution of livestock water
are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the
horses’ primary food source. Reducing imported feed stabilizes costs and provides
a food source nearer to the natural diet of cows. Results of grass trials initially
conducted at five sites across four Hawaiian Islands were instrumental in
identifying appropriate varieties of grass, and suitable sites to support sufficient
“dry matter” grass yield essential to a cow’s diet. Additional project-specific trials
at the Māhā’ulepū site on Kauai have been conducted for more than 18 months. The
results have identified sufficient yield and nutrition to supply 70 percent of the
cows’ diet; improvements in grass productivity are anticipated to provide up to
85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and
rest, which is part of the digestion cycle. The animals are managed in social groups
known as “mobs”, mimicking the natural social order of bovines. Cows spend 22
hours each of 24-hour period foraging on pasture or resting outdoors in natural
light and fresh air. The gently sloped paddocks, walkways and races minimize the
energy expended by the mature dairy cows as they graze or are transferred to and
from the various paddocks and the mature dairy facility; surfaces of the walkways
and cow races are designed to provide a comfortable path under hoof. The
management practices and pasture model applied by HDF maximizes grass as the
cows’ primary nutrition source and minimizes stress to the animals. Cows tend to
be healthier and live longer, productive lives with access to fresh air, high quality feed,
and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size.
Smaller paddocks located near the dairy facility will be used as temporary pasture
for cows or calves being moved on or off the farm. To protect the water quality of
surface water and downstream areas, paddock fences are set back 35 feet from the
edge of drainage ways throughout the site. Existing vegetation within the setbacks
will be managed or restored to reduce erosion, improve stability of ditch banks,
increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted
effluent through either the pivot irrigation systems or through gun irrigators.
Irrigation water supply is provided to the farm from Waia Reservoir, and will be
filtered and pumped to the various irrigation components on the farm. The
irrigation system is controlled using computer software and GPS receivers to allow
very precise application of irrigation and/or diluted effluent on the pasture. The
pivots can rotate and apply irrigation water and/or diluted effluent at different rates
depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the
desired use of the waste. Reflecting in the title of the livestock waste guidance for
Hawaii’s is the parenthetical inclusion of the word “nutrients.” Where waste is
utilized as a resource, it is being used for the constituent components that provide
benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to
commercial fertilizers, organic by-products, waste water, organic matter, and
irrigation water. Nutrient management is the practice of managing the amount, rate,
source, method of application, and timing of plant nutrients and soil amendments.
The timing and application of nutrients will correspond with plant uptake, soil
properties and weather conditions. For more information on nutrient balance
management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to
2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It
will be highly unlikely that the storage pond will be full at any time for the
contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow
dairy. Throughout the less than 30-day storage period, effluent is planned for
application every four days, and the slurry application is expected at least once
every 45 days, to ensure that the ponds are kept at manageable levels.

Cows last milk following the birth of calves. Newborn calves will be housed on
the Māhā’ulepū site and provided essential colostrum and nutrients for a healthy
start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF
before transfer to ranches on Kauai to be raised off-site. The committed herd size of
Animals in various stages of lactation and rest will be transferred between HDF and

The cultural assessment examined the potential effect of the project on cultural

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beliefs from their setting, and the potential of the project to introduce elements of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to

currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

FLOРА AND FАУNА:
Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing plant species and wildlife species, including any species as endangered, threatened, or proposed under any state or federal endangered species programs. Located within or within the immediate vicinity of the dairy site. The nature of the land and its topography and hydrology are such that a range of native plant and animal species will occur or could survive if planted, native plants will be used in the stabilization. That a majority of the documented sites are related to the historic-era is not surprising given the many land commission awards in the project area and are affiliated with significant cultural and natural resources, with technical studies in Appendix G and H.

ARСHАЕОLΟГИСКИЕ И CУЛЬТУРНЫЕ ИЗУЧЕНИЯ: The Hawai‘i Dairy Farms (HDF) project is subject to historic preservation review by the State Department of Land and Natural Resources, Division of the Comprehensive Cultural Resources Management (DLCRCM) pursuant to Section 6E of Chapter 16-43-HRS and Chapter 13-284-HRS. An Archaeological Impact Assessment (AIA) conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area. Six historic sites occur in the project area and at least occur in the extended survey area. Only one of the sites is believed to be associated with prehistoric era bridges. No further archaeological work is recommended at this time. A majority of the historic properties are not included in the proposed project area.

A botanical, avian and mammalian surveys were conducted in August 2014 by Rama Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the project site. There is no critical habitat for non-domesticated birds or terrestrial mammals on or near the dairy project area on lands owned by a different land owner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones

Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with significant cultural and natural resources. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with significant cultural and natural resources.
Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kauai may overfly the site. The endangered Hawaiian goose, nēnē was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kōloa area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to project-specified areas, marking tall structures and fencing with white visibility polytype, limiting nighttime lighting, and shading any outside lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site; thus it is expected that the dairy farm will not affect this listed mammalian species.

**NOISE:** Existing noise conditions of the project site and the surrounding Māhāulepū valley area are evaluated in the Draft Environmental Impact Statement (EIS), along with anticipated short-term and long-term noise conditions associated with the dairy farm and planned mitigation actions. Draft EIS Section 4.12 addresses noise conditions.

Noise can be defined as unwanted sound, a sound that is considered loud or unpleasant, and/or sound that causes disturbance. Research related to noise and livestock focuses on noise levels and minimization of unexpected sounds that cause undue stress on cows. Noise stress results in loss of livestock productivity and thereby financial loss to farmers and ranchers. Little research exists on the sound levels from livestock.

Sound is measured in decibels (dB). The State of Hawaii's Department of Health (DOH) rules use the A-weighting sound network (dBA) in the HAR §1-46, Community Noise Control. Sound through the air is similar to ripples on a pond of water. In open space without reflection, ripples spread uniformly in all directions and decrease in amplitude further from the source. In free field conditions such as outdoors, amplitude drops by half as distance doubles (OSHA, 2016). When sound passes close to absorbing ground cover such as grassland and fields, the "soft ground" absorbs extra sound as it passes. The Hawai'i Dairy Farms (HDF) site in Māhāulepū Valley is approximately 2 miles from the resort area, and 1.5 miles from the closest residential areas (on land zoned for agriculture). Typical noise currently

generated near the HDF site includes truck ingress/egress along private farm roads, agricultural equipment, and cattle and sheep.

Construction work at the project site will involve activities that may generate an increase in noise levels. However, such exposures will be a short-term condition, occurring during daylight hours. Construction vehicles and activities must comply with DOH Administrative Rules. DOH noise control regulation requires a permit for construction activities that emit noise in excess of 78 decibels or that cost a total of more than $250,000. Mitigation measures to minimize construction noise will include the use of mufflers to suppress loud equipment and limitations on the hours of heavy equipment operation.

The dairy farm will utilize milking equipment contained in the milking parlor, and will use field equipment such as tractors. Under HAR §11-46, agriculture is classified as Zoning District Class C, which specifies maximum permissible sound levels of 70 dBA in the daytime and 70 dBA at nighttime. Dairy operations will generate noise in keeping with agricultural zoning of the parcel. The primary noise receptors in the area would be farmers working nearby parcels. Noise from the dairy will not exceed the DOH threshold, and will not contribute to excessive noise in the region.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plach Economic Studies. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to ongoing dairy operations would be created on O‘ahu.

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HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For ongoing operations at the contemplated herd size, an additional 5 full-time farm jobs would be added with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.14, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Nāpali formation lavas of the Waimānāo volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black alhyd day and clayey silt.
animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po‘ipū’i region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa-Po‘ipū’i-Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwhi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 75-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected
from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three times per year, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Pu‘ipu‘i region were also calculated. Nitrogen input to the marine environment in the Pu‘ipu‘i region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pu‘ipu‘i region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downstream from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Wai‘āpili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively dispenses inputs within several meters from shore. Comparing nutrient constituent levels in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

TRAFFIC: The Draft Environmental Impact Statement (EIS) Section 4.18 and 4.25 includes an evaluation of roadways and traffic conditions, along with potential impacts of the dairy farm construction and operation. Primary access to the site is via Māhā‘ulepū Road, a two-way, two-lane road, which is accessible from Kōloa Road (Highway 530) via Ala Kinikoi Road. Within the project area, there is a network of unimproved private agriculture haul roads that provide access to and from Māhā‘ulepū Road.

Roadways in the project area operate smoothly with no periods of heavy traffic. On average, traffic in the region is much lower than urban areas in the state due to the low population of Kaua‘i and rural agricultural demographics of the south Kaua‘i area and Māhā‘ulepū. Traffic on Māhā‘ulepū Road consists of agricultural vehicles, residential and resort visitor traffic.

During construction, the proposed project is not expected to have a significant short term impact on traffic operations in the project vicinity. Additional traffic will be generated during construction, but will return to normal levels after project completion during day-to-day operations. There will be no change to traffic patterns or infrastructure related to the public roads.

Traffic operations along Māhā‘ulepū Road and the surrounding County roads are expected to continue to operate at acceptable levels of service during peak hours of traffic. The projected increase in vehicle movements related to HDF operations for the committed herd size of 699 cows would include 5 daily employees accessing the site, milk tanker and supply trucks every two days, and truck with stock trailer, for a total of 12 additional vehicle trips per day. Daily traffic along Ala Kinikoi Road and Kōloa Road was 8,000 and 6,500 cars daily; HDF-related traffic would add less than one percent additional trips. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area.
At a contemplated herd size of up to 2,000 cows, an additional 11 vehicle trips per separate milking cycles—as moving to and from the barn for the 10- to 15-minute milkings sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM$_{10}$ and PM$_{2.5}$) measured on the island of Kaua'i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM$_{10}$ is 2.01 μg/m$^3$, well below the State standard of 150 μg/m$^3$. The estimated concentration for PM$_{2.5}$ is 0.23 μg/m$^3$, well below the Federal standard of 35 μg/m$^3$ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1.670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of

**AERMOD**

Yuri Montgomery
May 26, 2016
Page 15 of 18
worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

**ALTERNATIVES:** As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action's purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action's purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai'i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua'i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State's fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: search "Hawaii Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

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I have had the opportunity to meet with several different Council people over the past year to ask, “What are you thinking?” in allowing a dairy or any industrial farm use of land right next to our most treasured beaches and Kauai’s most visited resort area. Their reply has always been that it was a legal use of agricultural land. “Legal” does not make it smart, equitable, clean, or good planning for Kauai’s future.

I personally lived in Kekaha for many years with the Waimea Dairy operating approximately two miles away and you could smell the small number of cows kept there. You were also constantly fighting huge flies that made their home at the dairy and visited the neighboring area all too frequently.

Kauai needs forward thinkers. Representation that has vision and can put together a future for this island with reason and good sense. You already have all the reasons it is a terrible idea to locate a Dairy next to a population base much less a resort area. The owner of the company is not living next to or on the dairy, he is living on the north shore where his real estate and land holdings will not be impacted by odor and bacteria in the water.

There are other places to locate this dairy that would not negatively impact Poipu. Why are those areas not being considered? Is the County going to gain infrastructure from this development? After Poipu property values are negatively impacted by this fiasco they are going to have to figure out where to next get those lost property taxes.

Personally, I think cows are great but I also grew up on a farm and I know that cows, particularly in the numbers planned, can create a hazardous environment. This is not BS. You already know these cows should not be located near a resort area, or a culturally sensitive area or a water shed or a beach or any coastal waters.

If the calculation that 2,000 cows will produce the same amount of waste as generated by 328,000 humans is true, and I believe it is. You had better consider moving the dairy much farther inland. Consider the impact of cesspools that would service 328,000 people concentrated in the area where the dairy is proposed. It’s all about priorities, if you don’t save the environment there will be no one around to drink the milk.

Lee Morey
Lee Morey  
May 26, 2016

Subject: Hawai`i Dairy Farms  
Environmental Impact Statement Preparation Notice  
Māhā`ulepū Road  
Kaua`i, Hawai`i  
TMK: (4) 2-9-003:001 portion and 006 portion  
(4) 2-9-001:001 portion

Dear Lee Morey:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai`i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:**  
Hawai`i Dairy Farms (HDF) will establish and operate a sustainable, rotational-grazing dairy farm in Māhā`ulepū Valley on the island of Kaua`i to produce fresh, locally available nutritious milk for Hawai`i families. The rotational-grazing method utilizes 100 percent of the cows' manure as a natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a "zero-discharge, grass-fed dairy". The term "zero-discharge" under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows' manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to groundwater and surface waters. Therefore, HDF elected to discontinue use of the term "zero discharge" as it was construed as no nutrients into the system.

The term "grass-fed" was used in the HDF EISPN. This term was used to identify HDF's intent to utilize a locally-produced feedstock - grass - for more than 70 percent of the dairy herd's diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of "grass-fed". The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of "grass-fed", the term in not used in this EIS.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock - grass - as the herd's primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient "dry matter" grass yields essential to a cow's diet. Additional project-specific trials at the Māhā`ulepū site on Kaua`i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows' diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as "mobs", mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and race facilities maximize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The

Lee Morey  
May 26, 2016  
Page 2 of 14
management practices and pasture model applied by HDF maximizes grass as the primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent. Nutrient management is the practice of managing the amount, rate, timing, and placement of nutrients applied to the land to meet crop production needs while minimizing losses of nutrients to air and water. Nutrient management practices include application rate, placement, and the use of precision irrigation systems to apply water and nutrients to the soil in amounts and patterns that enhance the uptake of nutrients by the crop while minimizing losses.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to the HDF site and provides technical guidance on applying agricultural waste depending on the properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.2, and Draft EIS Appendix D.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM discourages reproduction with appropriate non-chemical controls and promotes the use of biological controls for fly populations. Suitable controls include management practices such as livestock rotation, crops that attract natural predators, and the use of traps and fly lures.

The effluent storage pond is sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 80 days of storage for 699 mature dairy cows. The effluent pond is expected to be filled at any time the storage pond is at full capacity. Additional storage facilities are being designed and will be included in the project.

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The NRCS Conservation Practice Standards provide technical guidance on applying agricultural waste depending on the properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.2, and Draft EIS Appendix D.

Flies were identified in the survey of the site and on the site. The two flies associated with livestock are the stable fly and the horn fly. These flies and the green bottle fly are common in areas with high pet populations. It is possible that fly species could be attracted to the site and could require further control measures. The NRCS Conservation Practice Standard 590, Nutrient Management, applies to the HDF site and provides technical guidance on applying agricultural waste depending on the properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.2, and Draft EIS Appendix D.

The effluent storage pond is sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 80 days of storage for 699 mature dairy cows. The effluent pond is expected to be filled at any time the storage pond is at full capacity. Additional storage facilities are being designed and will be included in the project.
An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhā‘ulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pats in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōloa-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ah Kinoiki Road between Kōloa and Po‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animals wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketong the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 105 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health: Milk Rules require that potable water be used for milk production, both in the milking parlors and for milk production; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.
Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 324 MG, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhū‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhū‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhū‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhū‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawashi Cove Reserve in April 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhū‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhū‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator bacteria levels found in ditches running through Māhū‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filtration strips that could capture particulates during storm events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 670 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to
increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfalls of 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Pōpūpū region were also calculated. Nitrogen input to the marine environment in the Pōpūpū region is calculated to be 38,510 pounds annually, or 35 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pōpūpū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipā Pū Pū ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be conducted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farming operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the
background concentration of particulate matter (both PM$_{10}$ and PM$_{2.5}$) measured on the island of Kaua'i), and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM$_{10}$ is 2.01 μg/m$^3$, well below the State standard of 150 μg/m$^3$. The estimated concentration for PM$_{2.5}$ is 0.23 μg/m$^3$, well below the Federal standard of 35 μg/m$^3$ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odor emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity/mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EB include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,676 feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the committed expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements:

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to
produce 10 percent of the State’s fresh milk demand thus reducing
dependence on imported milk (Objective 1). This alternative, however, would
not reduce reliance on costly imported fertilizer and feed (Objective 2); grow
local, quality grass as a primary feedstock (Objective 3); and would not utilize
100 percent of manure on site as nutrients to grow forage for dairy cows
(Objective 4).
None of the alternatives would secure a dairy location that meets the
requirements for a pastoral, pasture-based grazing dairy: sufficient
contiguous land area; available long-term land tenure; adequate potable water
supply; suitable soil properties; gentle slope conditions; and accessibility
(Criterion 1).
One alternative (Agricultural Park) could potentially generate new long-term
employment in the agricultural sector on Kaua‘i in a wide range of positions
including pasture agronomy/soil science, environmental resources
management (Criterion 2).
The Agricultural Park alternative could also develop sustainable food
production utilizing Important Agricultural Lands, demonstrating the
importance of long-term agricultural leases and capital investment for
agricultural infrastructure, water systems and support facilities (Criterion 3).
However, after years of trying, it appears there was limited interest in such a
venture.
Finally, addressing the range of potential environmental impacts (natural,
cultural, social and economic) (Objective 8) the two alternative development
scenarios would generate fewer beneficial impacts and produce impacts that
could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of
Hawai‘i Dairy Farms, was determined to be the most viable option and is the
preferred alternative. Of all the alternatives considered, this is the only approach that
achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy
  operation in Hawai‘i, with the capability to provide more than 1,000,000
gallons of the fresh milk demand, reducing dependence on imported milk
  (Objective 1).
- The planned dairy location meets the requirements of minimum land area,
suitable soil properties, slope conditions, water supply, land tenure and availability,
and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the
  agricultural sector on Kaua‘i, including pasture agronomy/soil science,
veterinary and animal husbandry, environmental resources management,
milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion
  3) will occur with the proposed action, demonstrating the importance of long
term agricultural leases, and the ability to draw capital investment for
agricultural infrastructure including water systems and support facilities
(Criterion 3).

This response letter accompanies your copy of the Draft Environmental Impact
Statement (EIS). The Draft EIS is available on the OEQC website at the following
URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Sir, Ma'am,

I am terribly disturbed on many levels by the threat of an industrial Dairy at Māhā'ulepū Valley. The imminent damage to this unique pristine island physically, culturally, and economically cannot help but be disastrous. I definitely support farming on the island but absolutely not an industrial Dairy with unprecedented number of cows per grazing acre in a culturally sensitive, unique and wonderful Oceanside Valley. I fully support small dairy farms. I grew up on a dairy farm building to 100 milking cows plus calves, a few hogs, horses and chickens while growing all of our hay, corn, wheat and vegetables on 370 acres. It was truly an organic farm which my family struggled for years to build.

At age 21, my uncle died from a bacterial infection contracted when he drank from a stream that ran through one of our pastures. This is still a vivid memory for our family and I can't believe that Grove Farm refuses to post a sign warns families of small children about the known bacterial content in the stream coming from the proposed HDF farm site that emerges near the mouth of the cave and forms a fresh water pool on the soft sandy beach at Māhā'ulepū. That warm pool with the stream running through it to the ocean is a favorite playground for island children and visitors. In my mind, and as a tax payer, it is almost criminal that our State Department of Health also refuses to post a sign about this known bacterial contamination. Hopefully Grove Farm and the State Department of Health have deep pockets.

In my reading of the EIR/RIA, it does not, but should include a detailed study of the known pollution with identification of its cause and method to eradicate. No further development should proceed until HDF can prove to the public that the contamination has been eliminated and will not recur with any activity they propose. If they are not able to do this with any degree of scientific proof, (not unsubstantiated promises) then Grove Farm and HDF must be directed by our Department of Health to relocate HDF proposed animal feed operation to a safer environment without the obvious risks occurring at Māhā'ulepū.

The watershed and hydrologic drainage from the proposed farm site, both above and below ground must be thoroughly assessed by an environmental engineering firm. Nothing Less should be accepted by HDF or the Department of Health. We will wait and watch for the results of that study.

I also have vivid memories of the difficult days on the farm when it rained a lot and the smell of the manure was intolerable. Or (overwhelming) how will Kauai Dairy Farm eliminate that horrible smell? It is not possible to do so. Any traveler will attest that the smell travels for miles and miles. Islanders remember Meadow Gold's 400 herd dairy farm in Maloal. Their run off including the ground water under the road polluted Molokai Bay causing the State Health Department to close it down.

I clearly remember the cows crying while birthing and the incessant flies in our home and the Nasty Insect bites that never subsided. My brothers and sisters and I grew up with a fly swatter in our hands. Often these bite sites would fester and infect. Now that I am older, I realize that but for the healthy hard working life on the farm, these bites might have made us much sicker. As is it, the five of us did suffer from bouts of impetigo. I cringe at the thought of what is likely to happen with resident and visitor children who would not have the acquired immunity from growing up with these biting insects. None of the 5 of us children wanted to continue our farm. I know full well that our experience will pale in comparison to the threat of this dairy farm, polluting the streams, the ocean/playa along the south shore, our 3 water wells – 1 of which is less than 750 feet from the most well draining part of the land, where you plan to pump the sludge from the pond that had been collected from the floor of the milking parlor. Speaking of one of the terrible effects of ocean contamination, The Manure in the water, with the direction of the wind and ocean stream, will be trapped in the Children's Swimming Area of Polpou Beach Park, the best toddler ocean pool in Hawaii which is part of Polpou Beach, voted the No. 1 Beach in the United States and always along with Hanalei in the top Ten. What were we thinking? Please consider other more isolated locations for the sake of all Kauaians. Go to plan C or D or E. This plan will be a disaster.

The EIS must include a detailed study of the probable massive fly population that will develop in the warm moist climate in Māhā'ulepū and prove that the fly population can be sufficiently abated to assure that visitors to Māhā'ulepū and the south shore will not be sickened from bites from these flies.. As any entomologist will confirm, and as I experienced growing up, 1 fly lays a minimum of 300 eggs and they prefer warm wet manure. The types that develop in manure are horn flies, stable flies, deer flies and horseflies all piercing sucking flies that exist on blood. Our frequent rains will greatly increase their proliferation and these flies fly up to 4 miles from the site. Within a few months, there will be billions of flies. What facts will your EIS offer as proof that this will not happen? Please hire the best environmental entomologist available for your study who is not affiliated with International 70.

The EIS needs to provide proof as to how the HDF will stop the "Run OFF". Gravity operates at even a small pitch (definitely over clay) and this land is only 65 feet above sea level. You are sloping the land to the ditches to encourage control of the run off but really just passing it to the Waipouli stream which runs to the ocean. In a few years it will have polluted all the beaches along the south shore. In addition, What facts can you give us as to how you will reduce the Nitrate in the water and the methane gas contribution to our fragile Ozone layer. You study must also address these issues.

There will be no more eating on our lanais, thriving outdoor restaurants or picnics on the beach. Bankruptcy of restaurants and businesses and condos will follow as most of us can not afford air conditioning and will need to Give Up our retirement dream. Unemployment will rampant as the economy of the entire island gradually declines from loss of jobs related to our disappearing Visitor Industry. In return you are offering maybe a dozen "filthy jobs" for locals. Bottom line is - your goal is to take the "gold" and leave us the "poop". Why not STOP Now and Look for a suitable location and a lower dairy cow to acre ratio. It will save everyone a great deal of pain and money and would give our young people hope that THEY TOO will have a future on this God Given Island of Kauai.

[Signature]

Jan Muller
FO Box 1575 Koloa, HI 96756
Jan Muller  
P.O. Box 1575  
Koloa, HI 96756

Subject: Hawai'i Dairy Farms  
Environmental Impact Statement Preparation Notice  
Māhū'ulepū Road  
Kaua'i, Hawai'i

TMK: (4) 2-9-003:001 portion and 006 portion  
(4) 2-9-001:001 portion

Dear Jan Muller:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. As the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai'i Dairy Farms (HDF) will establish and operate a sustainable, pasture rotational-grazing dairy farm in Māhū'ulepū Valley on the island of Kaua'i to produce fresh, locally available nutritious milk for Hawai'i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed.” The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed,” the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a locally feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhū'ulepū site on Kaua'i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “moats”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the
energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawaii is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻuʻelep site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to the ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāʻuʻelep site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd. Heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted.

HDF will filter and pumped to the various irrigation components on the farm. The PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhāʻuʻelep area, as well as the parasites and predation that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila melanaphila, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-ʻōhi‘a forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950
to reduce livestock-related insects, IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhāulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pats in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōaua-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ah Kinoi Road between Kōaua and Po‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animals wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

**NOISE:** Existing noise conditions of the project site and the surrounding Māhāulepū valley area are evaluated in the Draft Environmental Impact Statement (EIS), along with anticipated short-term and long-term noise conditions associated with the dairy farm and planned mitigation actions. Draft EIS Section 4.12 addresses noise conditions.

Noise can be defined as unwanted sound, a sound that is considered loud or unpleasant, and/or sound that causes disturbance. Research related to noise and livestock focuses on noise levels and minimization of unexpected sounds that cause undue stress on cows. Noise stress results in loss of livestock productivity and thereby financial loss to farmers and ranchers. Little research exists on the sound levels from livestock.

Sound is measured in decibels (dB). The State of Hawai‘i Department of Health (DOH) rules use the A-weighting sound network (dBA) in the HAR §11-46, Community Noise Control. Sound through the air is similar to ripples on a pond of water. In open space without reflection, ripples spread uniformly in all directions and decrease in amplitude further from the source. In free field conditions such as outdoors, amplitude drops by half as distance doubles (OSHA, 2016). When sound passes close to absorbing ground cover such as grassland and fields, the “soft ground” absorbs extra sound as it passes. The Hawai‘i Dairy Farms (HDF) site in Māhāulepū Valley is approximately 2 miles from the resort area, and 1.5 miles from the closest residential areas (on land zoned for agriculture). Typical noise currently generated near the HDF site includes truck ingress/egress along private farm roads, agricultural equipment, and cattle and sheep.

Construction work at the project site will involve activities that may generate an increase in noise levels. However, such exposures will be a short-term condition, occurring during daylight hours. Construction vehicles and activities must comply with DOH Administrative Rules. DOH noise control regulation requires a permit for construction activities that emit noise in excess of 70 decibels or that last a total of more than $200,000. Mitigation measures to minimize construction noise will include the use of mufflers to suppress loud equipment and limitations on the hours of heavy equipment operation.

The dairy farm will utilize milking equipment contained in the milking parlor, and a m o n g  d u ng  b e e t l e  s p e c i e s  w i l l  w o r k  t o g e t h e r  t o  b u r y  d u n g  p a t s  in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.
soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two water bodies within Māhāulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāulepū 14 well and the County's Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Poipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Poipū - Kalahoe districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resources Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hā'upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāulepū Road. This ditch, named Waiōpili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment log around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiōpili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore
recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CBW to conduct a "Sanitary Survey" of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Ko'au, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CBW noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Library" (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35 feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HD freshwater budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīkūa-Pōpū region were also calculated. Nitrogen input to the marine environment in the Po'ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input to the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.
AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylot" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kaua’i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m3, well below the State standard of 150 μg/m3. The estimated concentration for PM2.5 is 0.23 μg/m3, well below the Federal standard of 35 μg/m3 (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1.670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analyses were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual odors odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.
**Alternatives**: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action's purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action's purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules Hawai’i Administrative Rules Chapter 11-200 (HARS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Renowing the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua’i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements:

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai’i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua’i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai’i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai’i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai’i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua’i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
• Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

• Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawaii's Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
John T. Jr. Muller  
2363 Pau Rd, Apt 1D  
Kalaheo, HI 96741  

May 26, 2016

Subject: Hawai‘i Dairy Farms  
Environmental Impact Statement Preparation Notice  
Māhāulepū Road  
Kaua‘i, Hawai‘i  
TMK: (4) 2-9-003: 001 portion and 006 portion  
(4) 2-9-001: 001 portion

Dear John T. Jr. Muller:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (mgd), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 mgd). These demands are a small fraction of the 3 mgd produced by the on-site, existing Māhāulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāulepū 14 well and the County’s Kōloa F well will result in no adverse impacts to ongoing use of...
facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment log around drain inlets.

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Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
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The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai'i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhūʻulepū Valley on the island of Kaua'i to produce fresh, locally available nutritious milk for Hawai'i families. The rotational-grazing method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.
The Environmental Impact Statement (EIS) Preparation Notice (EISP), published January 23, 2015, described the proposed pasture-based rotational grazing system from the various paddocks and the mature dairy facility; surfaces of the walkways as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be fed “grass-fed”. The USDA defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term “grass-fed” was used in the HDF EISP. This term was used to identify HDF’s intent to utilize a locally-produced feedstock — grass — for more than 70 percent of the herd’s diet. In January 2016, the U.S. Department of Agriculture estimated 10 to 15 percent of U.S. cattle are fed “grass-fed” feed. Therefore, HDF elected to discontinue use of the term “zero-discharge” as it was considered no nutrients into the system.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of the ponds and prevent effluent from being deposited on the farmland, the effluent will be managed or restored to reduce erosion, improve stability of ditch banks, and increase net carbon storage, and improve water quality. The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigation. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent to different paddocks depending on the actual irrigation needs of the farm. The irrigation system is expected to be in place by the time the first herd arrives in late August 2016. The soil on this site was not treated with commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients is critical to support sufficient dry matter grass yields essential to cow’s diet. Additional project-specific trials have identified sufficient yield and nutrition to support up to 85 percent of the cow’s diet. Drainage improvements in Draft EIS Section 3.5, and Draft EIS Appendix D.

The pasture-based model allows cows to move about freely, and to lie down and exercise while they forage. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. The timing and application of nutrients is critical to support sufficient dry matter grass yields essential to cow’s diet. Additional project-specific trials have identified sufficient yield and nutrition to support up to 85 percent of the cow’s diet. Drainage improvements in Draft EIS Section 3.5, and Draft EIS Appendix D.

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start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

SOILS: Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during dryer periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient applications. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawai‘i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soils Resource Report for Island of Kaua‘i, Hawai‘i.” The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalihi Clay at 32 percent, Ka‘ena Clay Brown Variet at 29 percent, and Lu'auakalani Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micro nutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as ‘poorly drained’, and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen, phosphorus, calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas “drainage” refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrites and nitrates to gaseous forms, which reduces the potential for impacts on waterbodies. In this way, “poorly drained” soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than “well drained” soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai‘i’s soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with the potential to offset up to one-third of the annual increase in atmospheric carbon
dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in arid to semi-arid climates, partly due to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on the quality of groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawaiian Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area's hydrology is shaped by its geology. The Kūloa area was built by Napali formation lavas of the Waimanōa volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāuleπuʻu Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is overlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) ground water located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāuleπuʻu Valley and the HDF site ranges from 0.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kūloa-Poʻipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two water bodies within Māhāuleπuʻu may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.07 million gallons per day (MGD), of potable drinking water quality water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlors and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāuleπuʻu 4 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-gallon per day (GPD) of potable water used in the milking facility meets the Remote Area Potable Water Supply Guidelines.

**WATER QUALITY:** The biology of the water bodies includes large numbers of benthic invertebrates and fish species. The quality of groundwater and surface water was documented.

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The State Department of Land and Natural Resources Commission on Water Resources Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā'ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā'ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā'ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha'upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā'ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction**: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) — Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality**: The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data; however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/control requirements, and it could not be used for regulatory purposes. CWB found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā'ulepū Valley. The deme canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The

Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers**: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainage ditches (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application**: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplemental. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 423 of the BS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā'ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 908 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8
inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po'ipu region were also calculated. Nitrogen input to the marine environment in the Po'ipu region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipu region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipoli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kauai community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawaii Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
5. When evaluating impacts on flora, fauna and the coastal waters and ocean resources, the EIS needs to take into account seasonal variations and the kind of climate extremes we have here on the south shore, not just average conditions. This includes evaluations of impacts of the dairy on the wetlands, Nene, Koloa duck, shearwaters, monk seals, blind cave spider and arthropod as a result of such seasonal variations.

6. The EIS needs to address the impact of moving cows and calves, milk, feed and equipment, to and from the dairy to and from other areas on the island, especially impacts on the roads, the traffic, etc. Impacts to the roads and traffic need to be incorporated into county models and repair cycles.

7. The EIS needs to be clear about grass fed vs grain fed criteria in its assessment of environmental and health impacts. If the grass does not grow well enough, will more grain be brought in? And if so, at what point will this no longer be a grass fed dairy, but be grain fed (feedlot). If more grain, less grass, is to be allowed as a contingency, how will this change the EIS evaluations?

8. The EIS needs to be clear as to the maximum number of head of cattle that will be in this and other areas for any given number of milking cows.

9. The EIS needs to address how and when the Maha'ulepu area will be restored when dairy operations cease; and identify bonds to ensure such restoration in case bankruptcy is declared.

10. The EIS needs to assess impacts on cultural and archeological sites, including petroglyphs and burials. This includes impacts on taro loi and other potential agricultural crops.

11. The EIS needs to identify other locations that would be better suited to this sort of dairy, especially locations away from resident populations and visitor destinations. And it needs to identify alternatives uses for this land.

12. The EIS needs to show a comprehensive risk management plan with contingency planning for the various herd sizes possible.

13. The EIS needs to show the maximum density of cattle per acre at various times in the day and through the year.

14. The EIS needs to identify quantities of artificial fertilizers that might be used to help the grass grow and evaluate their impacts especially on water purity levels for drinking water.

15. The EIS needs to identify types and quantities of pesticides and herbicides that might be used, as well as hormones and antibiotics, that might be used. And then the EIS needs to evaluate their impacts, especially on water purity levels for drinking water.

16. The EIS needs to assess the impact of additional pests, like the flies that cattle attract, to the environment and to residents and visitors to Maha'ulepu and the south shore communities.

17. The EIS needs to identify what bonds would be posted to ensure environmental impacts can be remediated, especially in case bankruptcy is declared.

I am attaching a copy of these comments in the attached.

Mahalo for addressing these concerns.

Mary Neudorffer
1870 Ho'one Rd #821
Koloa, HI, 96756
emileane@gmail.com
SUBJECT: Comments on Hawaii Dairy Farms' EIS Prep Notice from Mary Neudorffer

Aloha Laura McIntyre and Jeff Overton,

I wish to be a consultant party for the draft EIS. I have been living in Po'ipu, Koloa, for more than 14 years. I love to visit Maha'ulepu to hike, swim, spend the day, and generally enjoy the beauty, the fresh air and the peacefulness of this open, undeveloped area.

I am concerned about the impacts of the proposed dairy on Maha'ulepu, Po'ipu, Koloa and the other south shore areas and on the preservation of our enjoyment of such a special place as Maha'ulepu.

Specific points that I believe need to be addressed in the draft EIS are as follows:

1. The EIS needs to set forth environmental impact monitoring with criteria for actions including possible closure of the dairy when certain criteria are exceeded. Actions should include requirements for impact mitigation; alternative operational planning, including when to cease operations; and restoration of the areas impacted. The EIS needs to identify which environmental monitoring, criteria, and actions proposed would be binding and enforced and how any changes to this would be vetted with concerned parties.

2. The EIS needs to show how the public will be kept informed of environmental impact monitoring results.

3. The EIS needs to show how the range of beneficial uses of the Maha'ulepu area and the south shore surrounding areas will not be impacted by the dairy especially via water, smell, sounds, and access.

4. The EIS needs to address environmental and usage impacts using realistic range of scenarios, not just averages. For example, it is realistic to expect during the life of the dairy that there will be one or more hurricanes like Iniki and Ewa; sporadic very heavy rains like the 42 days of constant rain a few years ago, where the ground was thoroughly saturated; heavy winds; and increasing temperature highs and lows like the record highs and lows we are now getting.

5. When evaluating impacts on flora, fauna and the coastal waters and ocean resources, the EIS needs to take into account seasonal variations and the kind of climate extremes we have here on the south shore, not just average conditions. This includes evaluations of impacts of the dairy on the wetlands, Nene, Koloa duck, shearwaters, monk seals, blind cave spider and arthropod as a result of such seasonal variations.

6. The EIS needs to assess the impact of normal strong trade winds, like 20-30 mph, and sporadic high winds on blowing the airborne liquid fertilizer/manure and smells around Maha'ulepu and toward Koloa/Po'ipu.

7. The EIS needs to address the impact of moving cows and calves, milk, feed and equipment, to and from the dairy to and from other areas on the island, especially impacts on the roads, the traffic, etc. Impacts to the roads and traffic need to be incorporated into county models and repair cycles.

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10. The EIS needs to address how and when the Maha'ulepu area will be restored when dairy operations cease; and identify bonds to ensure such restoration in case bankruptcy is declared.
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Mary Neudorffer
1870 Ho'one Rd #821
Koloa, HI, 96756
emeleanae@gmail.com

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Mary Neudorffer
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Koloa, HI, 96756
emeleanae@gmail.com

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhāʻulepū Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Mary Neudorffer:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai’i Dairy Farms (HDF) will establish and operate a sustainable, pasture-based grazing dairy farm in Māhāʻulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.
The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a "zero-discharge, grass-fed dairy". The term "zero-discharge" under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed not to discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term "zero discharge" as it was construed as no nutrients into the system.

The term "grass-fed" was used in the HDF EISPN. This term was used to identify HDF's intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds' diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of "grass-fed". The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of "grass-fed", the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area "footprint" will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient "dry matter" grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows‘ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as "mob", mimicking the natural social order of hovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word "nutrients." Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy
start. During the calves' initial 90 days, they will be transitioned to pasture at HDF
before transfer to ranches on Kaua'i to be raised off-site. The committed herd size of
699 mature dairy cows at the Māhā'ulepū site applies to mature mature dairy cows.
Animals in various stages of lactation and rest will be transferred between HDF and
other partner ranches as needed for animal health and dairy productivity. This will
benefit both the dairy and infuse the beef market in Hawai'i with a new, local source
of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers
(young female calves that haven't given birth) will be raised until ready to return to
the HDF herd as a birthing/mature dairy cow. For more information on off-site herd
management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows
effectively producing quality milk. All cows will be treated with a high standard of
care. Dairy managers and caretakers will be trained and competent in handling
animals to minimize stress and ensure the herd's welfare. A licensed veterinarian
may prescribe use of antibiotics approved by the Food & Drug Administration (FDA)
for treatment of illnesses. Adherence to guidelines that prohibit milk from cows
undergoing antibiotic treatment will ensure no adulteration of milk. Routine
laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will
not inject cows with bovine growth hormone, referred to as rBST or rBGH.

NATURAL HAZARDS: The potential impacts of natural hazards are evaluated in the
Draft Environmental Impact Statement (EIS), including flooding, tsunami,
earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhā'ulepū property is not known to experience flooding conditions. The area
is located within Federal Emergency Management Agency (FEMA) Zone X, areas
determined to be outside the 0.2% annual chance floodplain. The proposed location
for Hawai'i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside
the area known to be flooded. Kaua'i and Hawai'i islands in general, has experienced
tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands.

Although they occur infrequently, Kaua'i has received a greater amount of damage
from hurricanes when compared to the other Hawaiian Islands. Land management
personnel in the Māhā'ulepū region during and following the hurricanes that
affected Kaua'i in 1982 and 1992 observed defoliation of vegetation, and no flooding
events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy
facilities will meet International Building Code (IBC) 2006 standards with local
amendments. Provisions in design will address wind loading (including hurricane
gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of
the area recommended Seismic Site Class D under IBC standards be utilized for
foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent
ponds since rainfall has been recorded in Māhā'ulepū Valley. The effluent pond
capacity has been designed above the regulatory requirement to contain the 25-
year, 24-hour rainfall event. An emergency containment berm with additional
capacity for another 30 days is included in the design. This design exceeds
regulatory requirements, with containment in excess of the major rainfall events
recorded on Kaua'i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for
HDF internal use that addresses hurricane, fire, and potential flooding hazard
scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned
for in the disaster plan. The disaster plan relies upon knowledge of cow behavior,
and is based on extensive guidance for livestock protection from NRCS, the Florida
State Agricultural Response Team (SART), Pennsylvania State College of Agricultural
Sciences, and Cornell University Cooperative Extension. The plan includes safety
procedures during any disaster, follow up actions, and emergency contacts for
assistance before, during or following the event. Further information is provided in
the Draft EIS Section 4.6.2.

FLORA AND FAUNA: Botanical, avian, and mammalian surveys of the property were
conducted for the Draft Environmental Impact Statement (EIS) to assess existing
species on site, including identifying any species listed as endangered, threatened,
proposed under any state or federal endangered species programs in or near the
property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna
resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECOS
Consulting to assess existing plant species. The survey also investigated for the
presence of plants currently listed as endangered, threatened or proposed for
listing under Federal or the State of Hawai'i's endangered species programs, located onsite
or within the immediate vicinity of the dairy site. The nature of the land and its
present and historical uses for intensive agriculture very much limit the natural
plant species anticipated to occur on this land. Complete species lists are
included in the EIS, and no protected botanical species occur on the project
property. The project will include vegetated buffer strips along the drainage ways as
part of the Conservation Plan to reduce erosion and stabilize shipes. Where native
plants occur or could survive if planted, native plants will be used in the stabilization.
No long-term impacts to native plant habitats or endangered or threatened plants
species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological
Consulting, Inc. This survey was conducted to assess the potential presence of avian
or mammalian species currently listed as endangered, threatened or proposed for
listing under either Federal or the State endangered species lists. The survey
covered the dairy site area and immediate vicinity. Common birds and terrestrial
mammals were encountered on the property. There is no critical habitat for
described species in the upper Māhā'ulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby
taro farm located within the HDF site. Though the area does not provide critical
habitat, seabirds that nest in upland areas of Kauai may overfly the site. The endangered Hawaiian goose, nene was also seen on the site. State Division of Forestry and Wildlife Biologists have noted nene are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kīloa area, and the habitat present on parts of the site is suitable for nene nesting.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nene goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to project-specific areas, marking tall structures and fencing with white visibility polytape, limiting nighttime lighting, and shading any outside lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

INVERTEBRATE SPECIES: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist. The study summarized the presence or absence of native species or pest species associated with cattle manure in the general Māhū‘ulepū area, as well as the parasites and predators on site that control those species. Fieldwork was conducted during September 15-16, 2014. The entire study is included in Draft Environmental Impact Statement (EIS) as Appendix D.

CAVE AND LAVA TUBE INVERTEBRATES
There are no known caves or lava tubes found at or adjacent to the dairy farm property. The Kīloa Lava Tube System, which provides habitat for two endemic cave species, the Kaua‘i Cave Wolf Spider and the Kaua‘i Cave amphipod, is located several miles away from the dairy farm property. Both invertebrates are listed as endangered under the U.S. Endangered Species Act. Not all caves in the Kīloa area contain these invertebrates, as many do not contain the optimal climatological conditions required by these organisms. Neither the botanical and fauna survey nor the invertebrate survey revealed any evidence of lava tubes or caves on the property, and no such features have been reported for the area near the Hawai‘i Dairy Farms (HDF) site. Thus no cave invertebrate species will be affected by the dairy farm.

INTRODUCED PREDATOR INSECTS
An invertebrate study of manure-associated insects was conducted for the Draft EIS. The study included a field survey that used manure from an adjacent beef cattle herd as a lure, and determined flies and other manure-related insects currently present at the HDF site. Pest insects such as flies can negatively impact livestock health and production, and are therefore actively managed to prevent stress and loss of productivity at dairy operations.

At the HDF site, two common flies were identified: the stable fly and the horn fly. Both of these flies are widespread throughout the Hawaiian Islands. The greenbottle fly was reared from manure taken back to a laboratory following the field survey. Additionally, flies known to exist on Kaua‘i but not seen at the HDF site during the survey were identified and include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations.

In response to cattle-related insect pests, numerous species known to compete with related flies are extremely tiny parasitic wasps that prey on various fly species. The adult wasps could be described as the size of a gnat. Using an ovipositor – described by lay people as a “stinger” – the female lays eggs in the larvae or pupa of flies. The male wasp has no such “stinger”. See Draft EIS Section 4.11 for a photo providing scale for these tiny, non-stinging wasps.

To minimize potential establishment of pest flies or other insects, food waste generated during the construction phase will be bagged, covered, contained and disposed of in order to limit possible breeding habitat for flies. Inspections of building materials for ants or other insects will be conducted to prevent introduction of new pests to the HDF site. Short-term controls, including mechanical methods (e.g. sticky tapes or ribbons in the milking parlor, or traps with or without attractants) and chemical methods may be used to prevent short-term spikes in pest populations.

Insecticides and herbicides are non-discriminatory and kill beneficial as well as pest insects. Beneficial insects include primary decomposers such as earthworms and dung beetles, and pollinators including bees. Should chemical control be needed for
FLY POPULATIONS AT HDF WILL BE MINIMIZED THROUGH A PROCESS KNOWN AS INTEGRATED PEST MANAGEMENT (IPM). ESSENTIALLY, IPM DISRUPTS REPRODUCTION WITH APPROPRIATE MEASURES AT KEY POINTS IN THE PEST'S LIFE CYCLE. USED IN HAWAI'I FOR DECADES, A NUMBER OF INVERTEBRATES AND A BIRD (THE CATTLE EGG) WERE INTRODUCED BETWEEN 1898 AND 1950 TO REDUCE LIVESTOCK-RELATED INSECTS. IPM UTILIZES KNOWLEDGE OF THE ANCIENT FOOD WEB AMONG SPECIES BY DISRUPTING THE MANURE HABITAT REQUIRED TO COMPLETE THE LIFE CYCLE. HDF AND OTHER RANCHERS ON KA'U'I MAY CHOOSE TO ENGAGE WITH THE STATE DEPARTMENT OF AGRICULTURE TO TRANSLOCATION DUNG BEETLE SPECIES ALREADY INTRODUCED ON KA'U'I TO MĀHĀ'ULEPŪ AND OTHER AREAS WHERE MANURE-RELATED FLIES MAY BE A PROBLEM.

IMPACT OF SPRAYS ON BEES

Beneficial insects include primary decomposers such as earthworms and dung beetles, and pollinators including bees. Honey bees are an essential part of any agricultural ecosystem, and were observed on site during the invertebrate species survey. Pesticides and herbicides can reduce populations of beneficial insects, which is why HDF will utilize an integrated pest management approach.

It is expected that honey bees will visit water sources set up for the HDF herd. Preventative measures will be built into any open water source to prevent bees from being trapped, and HDF will contact local beekeepers for advice regarding any bees or bee colonies encountered on site. Safe application practices for any unavoidable herbicide or pesticide will be utilized in order to narrowly target the correct pest species without harming other insects and animals in the area. Anyone using herbicides or pesticides will be properly trained and informed, and if a honey bee colony location appears to be a danger to workers or cattle, or to be in danger itself, a local beekeeper will be contacted for advice and removal.

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā'ulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EB Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly and the chicken dung fly. These pests are common in areas with high pest populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila mauphila, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-ōhi‘a forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate measures at key points in the pest's life cycle. Used in Hawaii for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetle species will work together to bury dung pats in one to three days, a shorter amount of time than the 10–30 days flies eggs need to hatch.

In the Kūka‘Pōpū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ala Kinoiki Road between Kūka‘a and Po‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in the animal waste and animak waste within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

NOISE: Existing noise conditions of the project site and the surrounding Māhā'ulepū valley area are evaluated in the Draft Environmental Impact Statement (EIS) along with anticipated short-term and long-term noise conditions associated with the dairy farm and planned mitigation actions. Draft EIS Section 4.12 addresses noise conditions.

Noise can be defined as unwanted sound, a sound that is considered loud or unpleasant, and/or sound that causes disturbance. Research related to noise and livestock focuses on noise levels and minimization of unexpected sounds that cause undue stress on cows. Noise stress results in loss of livestock productivity and thereby financial loss to farmers and ranchers. Little research exists on the sound levels from livestock.

Sound is measured in decibels (dB). The State of Hawai’i Department of Health (DOH) rules use the A-weighting sound network (dba) in the HAR §11-46, Community Noise Control. Sound through the air is similar to ripples on a pond of water. In open space without reflection, ripples spread uniformly in all directions and decrease in amplitude further from the source. In free field conditions such as outdoors, amplitude drops by half as distance doubles (OSHA, 2016). When sound passes close to absorbing ground cover such as grassland and fields, the "soft
would be created on O'ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai'i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000-mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua'i, and 2 indirect jobs on O'ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua'i and another 8 indirect jobs on O'ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY:

Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area's hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimoa volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōla
established a 1,000-foot setback surrounding the Köloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:**
Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:**
The adjacent, developed Köloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DREDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Köloa - Po‘ipū - Kalalāo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**
The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels the plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evaportranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

**Potential Impacts from Construction:**
The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and...
prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makaawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāulepū Valley. The dene canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDE received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, US. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fencelines and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could cause high bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

To provide perspective, nutrient inputs from the adjacent Kōkua-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment:** An assessment of groundwater and surface water interaction with the marine water downstream from the dairy site was conducted by Marine Resource Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.
The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWS, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. ER sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1 Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAQAQ) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day. Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust levels of environmental concern. Data from the nearshore water monitoring was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m3, well below the State standard of 150 μg/m3. The estimated concentration for PM2.5 is 0.23 μg/m3, well below the Federal standard of 35 μg/m3 (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.
Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

**TRAFFIC:** The Draft Environmental Impact Statement (EIS) Section 4.18 and 4.25 includes an evaluation of roadways and traffic conditions, along with potential impacts of the dairy farm construction and operation. Primary access to the site is via Māhūʻulepū Road, a two-way, two-lane road, which is accessible from Kōloa Road (Highway 530) via Ala Kinoiki Road. Within the project area, there is a network of unimproved private agriculture haul roads that provide access to and from Māhūʻulepū Road. Roadways in the project area operate smoothly with no periods of heavy traffic. On average, traffic in the region is much lower than urban areas in the state due to the low population of Kaua‘i and rural agricultural demographics of the south Kaua‘i area and Māhūʻulepū. Traffic on Māhūʻulepū Road consists of agricultural vehicles, residential and resort visitor traffic.

During construction, the proposed project is not expected to have a significant short term impact on traffic operations in the project vicinity. Additional traffic will be generated during construction, but will return to normal levels after project completion during day-to-day operations. There will be no change to traffic patterns or infrastructure related to the public roads.

Traffic operations along Māhūʻulepū Road and the surrounding County roads are expected to continue to operate at acceptable levels of service during peak hours of traffic. The projected increase in vehicle movements related to HDF operations for the committed herd size of 699 cows would include 5 daily employees accessing the site, milk tanker and supply trucks every two days, and truck with stock trailer; for a total of 12 additional vehicle trips per day. Daily traffic along Ala Kinoiki Road and Kōloa Road was 8,000 and 6,500 cars daily. HDF-related traffic would add less than one percent additional trips. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area.

At a contemplated herd size of up to 2,000 cows, an additional 11 vehicle trips per day would access the HDF site, for a total of 23 vehicle trips daily. Projections for daily vehicle movements in 2035 for Ala Kinoiki Road and Kōloa Road are 7,200 and 9,500 daily vehicles. HDF-related traffic would add less than one percent. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area.

Traffic data is presented in the Draft EIS Sections 4.18 and 4.24.

Construction equipment mobilization will comply with Hawai‘i Department of Transportation and County requirements. Delivery trucks and milk tanker trucks will be in compliance with State and County size and weight limits; no oversized vehicles will be used for ongoing operations.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai‘i Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai‘i Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

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To Whom It May Concern:

The following is my response and comments after reviewing the Hawaii Dairy Farms EISPN, posted on January 23rd, 2015. I am requesting that each of my requests below are included and fully addressed by the Hawaii Dairy Farm EIS.

Section 3.2 Air Quality

Request: All areas of the EIS should evaluate the environmental impact with respect to 699 & 2,000 cows.

The EISPN mentions that the State of Hawaii DOH monitors ambient air at various locations for gaseous and particulate air pollutants. They also mention that air quality standards have been established for the following:
- Carbon Monoxide
- Nitrogen Dioxide
- Sulfur Dioxide
- Lead
- Ozone
- Particulate matter
- Hydrogen Sulfide

Comment: The EISPN does not include Ammonia or Nitrous Oxide in its scope, nor does the EISPN discuss monitoring stations and equipment used to monitor and understand the actual dispersal and effect of these gases and odors.

Request: All of these gases, particulate matter, and hazardous material must be addressed. This includes Carbon Monoxide, Nitrogen Dioxide, Sulfur Dioxide, Lead, Ozone, Particulate Matter and Identification of the expected composition of the particulate matter, Hydrogen Sulfide, Ammonia, and Nitrous Oxide.

Request: Each source of gas emissions should be analyzed to include pasture surfaces, effluent ponds, milking barns, etc.

Request: The EIS should include number, locations, and types of monitoring stations required to mitigate these risks.

Comments:
These pollutants and compounds have a number of environmental & human health effects.

Ammonia is a Respiratory Irritant that is rapidly absorbed by the upper airways in the body. Ammonia exposure can cause chemical burns to the respiratory tract, skin, and eyes. Longer term exposure can cause a severe cough, chronic lung disease and scarring of the airways.

Ammonia also has a direct toxic effect on vegetation. It can disrupt ecosystems, causing algae blooms in water bodies and acidification of soils.

The primary cause of ammonia emission is through land application when the manure is applied to land. This can occur immediately following land application and later over a much longer period when the substances in the soil break down. Nitrous oxide is also discharged in a similar manner.

Hydrogen Sulfide can cause inflammation of the moist membranes of the eye and respiratory tract and can lead to olfactory neuron loss.

Depending on the composition, Particulate Matter can cause Chronic Bronchitis and Chronic Respiratory Symptoms.

Koloa neighborhoods & Poipu neighborhoods are within 2.5 miles of the dairy.
Koloa Elementary School is located about 2.75 miles from the dairy site. Children breathe 20% to 50% more air than adults, making them more susceptible to lung disease and health effects. Moreover, a study in North Carolina found that the closer children lived near a CAFO, the greater the risk of asthma symptoms.

**Request:** The short and long term effects of all of these gases and particulate matter on the general population need to be included in the EIS. This includes effects on the elderly, people with allergies and/or asthma, etc.

**Request:** The short and long term effects of all of these gases and particulate matter and their effects on children should be included in the EIS.

**Request:** The EIS should identify the estimate used for their analysis to cover Ammonia & Hydrogen Sulfide discharges from the application of manure, pond storage, and milking parlor waste.

**Request:** The EIS should address the direction of the tradewinds and what areas the Ammonia, Hydrogen Sulfide will disperse to.

**Request:** The EIS should address any impacts based on air quality, to local wildlife and/or endangered species, based on air quality.

**Air Quality & Odor**

Comment: There is substantial evidence that large dairy farms affect the ambient air quality of local communities. Odor is not caused by a single substance, but as a result of a large number of contributing compounds. The odors emitted from dairy farms are a mixture of ammonia, hydrogen sulfide, and other organic compounds. Odor occurs when manure is stored in pits or lagoons for long periods of time. Moreover, depending on the method of disposal when liquefied manure is spread on the land, these odors can be amplified during dispersal and then emanate again after rainfall on the dry land.

Depending on weather conditions and dispersal techniques, these odors can be detected from up to 5 or 6 miles away.

According to wind speed and direction data from weather station data in the Lihue area, the tradewinds blow from a NE & ENE direction at 10 to 14 knots, over 60% of the time. 90% of the time in summer months.

**Request:** The EISP should address odor disposal and air quality in the surrounding communities with the tradewinds blowing in excess of 20 to 25 knots for long periods of time.

**Request:** The EISP should address the impact of odor and air quality when little or no tradewinds are blowing which may concentrate odors locally. Wind direction should be analyzed at several locations on the proposed site.

**Request:** The EIS should address how they will monitor, control and mitigate odor disposal from the dairy. A graphical analysis showing the overall effect and measurable distance of expected odor disposal should be analyzed with respect to the numbers of cows in the herd, the amount of manure & urine generated, the methods used to contain and disperse the manure/urine and wind speed and direction. (i.e. Odor footprint assessment & setback curv in all directions around the odor sources.)

**Request:** The EIS should also discuss methods to reduce the effective area of odor dispersal and methods used to continually monitor the situation and establish criteria for how often effluent can be dispersed on the land, and under what weather conditions must be in place for land application. Will wind conditions be taken into effect prior to land dispersal? What method of land disposal will be used? How long does it take for liquefied manure to be neutralized (stop stinking).

**Greenhouse Gases**

Dairy farms also contribute to greenhouse gases and can combine with other atmospheric elements to produce haze during periods when the tradewinds are not blowing. Methane and nitrous oxide are 25 and 300 times more potent as greenhouse gases as carbon dioxide. In past studies, the EPA has attributed manure management as the fourth leading source of nitrous oxide and the fifth leading source of methane emissions.

**Request:** The EIS should assess the amount of greenhouse gases that will be produced by the planned dairy during full scale operations and what effect these gases might have locally as they contribute to haze and/or combine with VDG during periods of southerly Kona winds.

**Section 2.4 Alternative Location**

Section 2.4 reads: The grass-fed dairy operation requires 500 to 600 acres of usable, gently-sloped land on agricultural zoned lands available for long-term lease.

Comment: Smaller herd sizes would need significantly less acreage. Several alternative locations should be considered with respect to smaller herd sizes.

**Request:** The EIS should evaluate several other locations for a sustainable “zero discharge” grass fed dairy. What other locations on island can support the following dairy sizes?
   a) 300 cow maximum.
   b) 699 cow maximum.
   c) 2,000 cow maximum.

**Section 2.3 Proposed Action**

Comment: "The pasture-based rotational grazing method focuses on growing grass as a local food source appropriate for cow health and quality milk production. The method developed by dairy experts is designed to be zero-point source discharge, meaning 100 percent of the cows’ manure will remain on the farm as fertilizer for the pasture grass”.

Comment: The zero-discharge dairy is dependent on grass fed cows and initially growing high quality Kikuyu & Kikuyu-Guinea grass.

**Request:** The EIS should address the environmental impact due to the use of commercial fertilizers used in order to grow this grass prior to the arrival of cows. The EIS should also address the overall effect on endangered species, and the Waipio stream.

**General Topic**

This dairy will use significant amounts of water.

**Request:** The EIS should identify how much water will be needed based on 699 to 2,000 cows and how this amount of water usage will affect the amount of water available to south Kauai — especially during drought years.
Subject: Hawai'i Dairy Farms

Environmental Impact Statement Preparation Notice

Māhā'ulepū Road
Kaua'i, Hawai'i

TMK: (4) 2-9-003: 001 portion and 006 portion
   (4) 2-9-001:001 portion

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area's hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimāna volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā'ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanic by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā'ulepū Valley and the HDF site ranges from 105 – 500 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poʻipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā'ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD). These demands are a small fraction of the 3 MGD produced by the on-site agriculture. The capacity of the dairy operation, and the 4,500-foot distance between the Māhā'ulepū 14 well and the County's Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

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May 26, 2016
Page 2 of 11
Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa Well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Pō‘ipi‘i region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Pō‘ipi‘i - Kalāheo districts), water use in 2015 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction

Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: sift fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements; and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Gvian Water Branch website under “Library” (http://health.hawaii.gov/cwb).

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times more nutrients than groundwater, due to the poor permeability of the
alluvium. Groundwater can discharge from the alluvium when it rises in water
periods and intersects the deep drainage ditches. Such discharge to the channels
could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to
groundwater from the HDF nutrient budget at two percent of nitrogen (totaling
10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per
year). Again, this nutrient run-off would not occur as chronic daily release; rather,
the runoff contributions would be limited to periods of the major rainfall over 0.8
inches. Such rainfall events are estimated to occur approximately three percent of
days, or an average of 10 days annually. Per best practices, no effluent application
would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōlos-Poʻipu region were
also calculated. Nitrogen input to the marine environment in the Poʻipu region is
calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of
potential nutrient throughput from HDF. Phosphorus for both domestic wastewater
and landscape fertilization in the region is estimated to be 1,260 pounds annually, or
1.4 times greater than the potential discharge from HDF. The nutrient inputs
from domestic uses in the Poʻipu region are constant throughout the year and no
mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment:** An assessment of groundwater and
surface water interaction with the marine water downgradient from the dairy site
was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the
Waipouli Ditch provides the majority of freshwater input in the immediate coastal
area. Water chemistry measurements made by MRCI identified mixing of ditch
water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just
10 days annually from dairy operations will not adversely affect ocean water quality
and the marine environment. The nearshore area is a highly mixed environment
which actively disperses inputs within several meters from shore. Comparing
nutrient constituents in surface water samples taken from the HDF site and the
agricultural ditches down gradient to nutrients sampled in the nearshore ocean
water revealed that indicator bacteria were substantially lower in the ocean than in
the ditch. The rapid decrease is likely a result of both physical mixing of water
masses and toxicity from saline water. In any event, the elevated levels of indicator
bacteria do not extend beyond the shoreline. Baseline water quality data and the
surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality
monitoring will be instituted in conjunction with the surface water quality
monitoring to regularly sample and analyze the nearshore ocean waters. The
ongoing testing program will provide feedback to the dairy management team to
help ensure that nutrients and bacteriological constituents are not being released at
levels of environmental concern. Data from the nearshore water monitoring
program will be shared with the DOH CBW, dairy neighbors and the local Kauaʻi
community.

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air
quality conditions and project impacts were evaluated, including dust and odor.
Potential odors and emission levels for air pollutants relevant to dairy operations
were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25
provide an evaluation of air quality and odors, including a windrose depicting wind
speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality
technical report can be found in Draft EIS Appendix I.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S.
Environmental Protection Agency (EPA) regulates both large and small sources of
air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for
six criteria pollutants. The State of Hawaiʻi has established its own State Ambient Air
Quality Standards (SAAS) that are as strict or, in some cases more strict than the
NAAQS. State standards prohibit any visible emissions of fugitive dust from
construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive
dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric
fermentation, and both methane and nitrous oxide (N2O) emissions from manure
application. No State or Federal regulations for greenhouse gas emissions from farm
operations or small businesses currently exist.
DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m², well below the State standard of 150 μg/m². The estimated concentration for PM2.5 is 0.23 μg/m², well below the Federal standard of 35 μg/m² (see Draft EIS Sections 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odor emissions for dairy feedlots were adopted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.
The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).

- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3).

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
The term "grass-fed" was used in the HDF EIS. This term was identified in the Draft EIS as a means to identify the proposed system as a "zero-discharge" system. HDF has identified a locally-produced feedstock – grass – for more than 70 percent of the dairy herd's diet. In January 2016, the USDA's Agricultural Marketing Service created a narrow legal definition of "grass-fed", including pasture raised, which is part of the Draft EIS Section 3.1, "Grass-Fed Dairy Operations: Proprietary Grazing System". The results have identified sufficient yield and quality for dairy cows to support sufficient productive milking capacity of the land, which is estimated to be up to 2,000 productive milking cows. The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups, known as "mob", mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways, and cow races are designed to provide a comfortable path under hoof. The pasture-based grazing system meets the requirements of the National Organic Program (NOP), U.S. Department of Agriculture as of April 1, 2016, and is certified organic by the Organic Valley cooperative, based in Organic Valley, Wisconsin. The pasture-based grazing system will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management. The pastoral rotational-grazing dairy provides a local feedstock – grass – as the primary feed source. Reducing feed delivery costs and providing a local feedstock to the proposed operations is anticipated to reduce overall feed costs. 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management practices and pasture model applied by HDF maximizes grass as the benefit both the dairy and the best market in Hawaii (a new, local source of pasture-based calves). Male calves will be part of the beef herd, whereas the entire female population will be utilized as a resource, it is being used for the constituent components that provide health of the herd is of primary importance as the success of a dairy relies on cows care. Dairy managers and caretakers will be trained and component in handling may and the use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows being delayed or receiving treatment will ensure no milk from cows not reject cows with bovine horns, referred to as BST or RFI.

The potential impacts of the Hula Harvest Dairy (HDF) project (a 2,000-cow dairy facility) on the existing dairy industry in Hawaii are being evaluated in the Draft Environmental Impact Statement (DEIS), including a fiscal impact assessment completed in April, 2016 by Plasch Economics Pacific. The HDF project would create direct-term benefits through jobs for local contractors, workers, labor and indirect jobs related to dairy production, including animal caretakers, veterinarians, suppliers, and butchers. The project would be highly unlikely that the storage pond will be full at any time for the development period. The direct plus indirect employment associated with the HDF project would be expected to average approximately 36 jobs, of which, 28 jobs would be on Kaua‘i.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to the existing dairy in Hawaii. Nutrient management is the practice of managing the amount, rate, timing, and application of nutrients based on the appropriate use of manure, commercial fertilizers, organic by-products, waste water, and organic matter, and applying irrigation water. The purpose is to maintain the productivity and health of the soil while minimizing the potential for nutrient losses to underground water resources. Nutrient management is designed to integrate plant nutrient and soil amendments.

The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft Section 3.5.3 and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for up to 699 mature dairy cows in the event of an emergency. The storage pond will be full at any time for the development period. The effluent application every four days, and the slurry application is expected to start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF

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annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,700 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai'i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua'i, and 2 indirect jobs on O'ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua'i and another 8 indirect jobs on O'ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kīlauea area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā'ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kīlauea series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt. The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is barred beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā'ulepū Valley and the HDF site ranges from 105 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kīlauea-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā'ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD) of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai'i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā'ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā'ulepū 14 well and the County’s Kīlauea F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā'ulepū Valley, HDF established a 1,000-foot setback surrounding the Kīlauea F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water
quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawahi Cave Reserve in April of 2014. The group reported high levels of enterococci to the State Department of Health (DOH) and provided its data; however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococci in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal wallows, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural...
fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōkua-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiʻoli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surfac marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua’i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two...
separate milking cycles—moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM2.5 is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odor emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawaii Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Hawai'i Dairy Farms
Maha'ulepu, Kaua'i

ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

An Environmental Impact Statement (EIS) is being prepared voluntarily by the Applicant to assess potential environmental impacts and mitigation measures associated with agricultural operations at Hawai'i Dairy Farms (HDF) at Māhā’ulepū, Kaua‘i.

To assist in preparing the EIS, an Environmental Impact Statement Preparation Notice (EISP) was recently published. A 30-day public comment period on the EISP ends February 23, 2015. The purposes of the publication and comment period are two-fold:

1. to allow individuals and groups to request to become a consulted party; and
2. to provide written comment regarding effects of the proposed action.

NOTE: Submitted comments will be published in the Draft EIS

Name: Tim O'Connor
Organization: O'Leary Farms

Preferred contact Method
Email: grow.kauai@gmail.com Postal Address: P.O. Box 1019 Kaua‘i, HI 96754
Phone: (Optional)

Comments: Please request to be a consulted party - negating me of EIS progress & opportunity for comment.

Return to:
Group 70 International, Inc.
925 Bethel Street, 5th Floor
Attn: HDF Project
Honolulu, HI 96813
hdf@group70int.com
Deadline: February 23, 2015

And/or:
Hawai'i State Department of Health
Environmental Planning Office
919 Ala Moana Boulevard, Rm. 312
Honolulu, HI 96814
gpo@hdo.hawaii.gov

May 26, 2016

Tim O'Connor
P.O. Box 1019
Kaua‘i, HI 96754
grow.kauai@gmail.com

Subject: Hawai'i Dairy Farms Environmental Impact Statement Preparation Notice
Māhā’ulepū Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001: 001 portion

Dear Tim O'Connor:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai'i Dairy Farms": http://tinyurl.com/OEQC-KAUA
Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
pollution, I am deeply concerned about the drinking water for the Kolou, Poipu area. The wells that supply drinking water for this area are in very close proximity to the proposed dairy. I am concerned that the waste from manure and urine will be above the water table where it will infiltrate other bodies of water, primarily the wells for this area.

In addition to the detrimental effects to water, I am concerned that the flies that will be produced as a result of the number of cows and their waste, will curtail the range of beneficial uses of the environment. I cannot imagine going to Mahuaupu Beach and dealing with the fly problem that I feel sure will be created, Mahuaupu Beach has been a favorite picnic and beach spot for me and my family for 40 years. I can’t imagine what it will be like to be at the beach and deal with swarms of flies from the nearby dairy.

I appreciate your sincere and careful investigation into these areas of concern. I have grave concerns about the wisdom of putting a dairy of this size in a place so near the beach and nearby resort locations.

Thank you for your attention in this matter. I look forward to hearing your report and findings.

Mahalo nui loa,
Polli C. Oliver

cc: Hawai’i Dairy Farms, LLC
State of Hawai’i DOT - Environmental Planning Office
The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system from the various paddocks and the mature dairy facility; surfaces of the walkways as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States.

The pastoral rotational-grazing dairy provides a local feedstock—grass—as the source, method of application, and timing of plant nutrients and soil amendments. The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Wai'anae Reservoir, and will be utilized as a resource, it is being used for the constituent components that provide very precise application of irrigation and/or diluted effluent to the various irrigation components and GDS recovers to allow the system to be controlled using computer software and GIS receivers to allow the net carbon storage, and improve and maintain water quality.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob”, mimicking the natural social order of bovines. Cows spend 22 hours of the day lying down, which is part of the digestive cycle. The animals are managed in social groups known as “mob”, mimicking the natural social order of bovines. Cows spend 22 hours of the day lying down, which is part of the digestion cycle. The animals are managed in social groups known as “mob”.

Agricultural infrastructure and utilities required for this dairy operation will be constructed on the site. Four buildings will be constructed to serve different functions, including storage tanks and silos, effluent storage ponds, livestock water systems, and irrigation equipment. The pastoral rotational-grazing dairy provides a local feedstock—grass—as the source, method of application, and timing of plant nutrients and soil amendments. The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Wai'anae Reservoir, and will be utilized as a resource, it is being used for the constituent components that provide very precise application of irrigation and/or diluted effluent to the various irrigation components and GDS recovers to allow the system to be controlled using computer software and GIS receivers to allow the net carbon storage, and improve and maintain water quality.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area will be constructed on areas that will be used for livestock, irrigation, and other agricultural activities. Additional building information can be found in the ROD Section 3.3.1

The term “grass-fed” was used in the HDF EISPN. This term was used to identify the nutritional and health benefits of cows that are not fed grain. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States.

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Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhū‘ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhū‘ulepū site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhū‘ulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila musciphila, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation kau‘ōhi‘a forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhū‘ulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pads in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kībō-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ala Kinoski Road between Kīo‘oa and Po‘ipū; it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animal wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

WATER QUALITY: Technical consultants conducted field studies and analysis of groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kīo‘oa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 600 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed muck. The Māhū‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kīōoa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick
alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents a comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and material. The alluvial material blanketing the valley floor is less permeable than the groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,500 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035. SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hā‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; geotextile filter fabric and sediment logs around drain inlets.
The 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands. Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted DOH to conduct a Sanitary Survey of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dene canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honouliuli District, U.S. Army Corps of Engineers (USACE) in 2013. Other farm operations are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain
Another comment that I would like to make that seems to be overlooked by most people in the public, is that so many people don’t know how milk is made!!!

Cows must be pregnant and calve to produce milk. That means the population of HDF’s cows will always be growing. A typical dairy cow must “go dry” for 2 months/year to recover and calve once again to produce milk. HDF, like most dairies will most likely use artificial insemination to impregnate their cows. That said, HDF has stated at public meetings that the excess calves, that will not be raised to add to the dairy herd or as replacement cows, will be sold to beef ranchers on Kauai.

What is not discussed, is the fact that dairy cows, particularly the New Zealand Dairy cows they have selected, make inferior beef producing cows. An excellent dairy cow, is an inferior beef cow, because the breed has been developed and selected to put metabolic energy into producing maximum amounts of milk, not muscle for meat production! Even if the dairy cows were a dual purpose breed, or cross bred with beef breeds like Herefords or Angus, the calves would not be worth much to the beef ranchers over time, and the production of calves from HDF each year would flood the beef cow/calf operators on Kauai with less than optimum meat quality cattle.

I do not believe this has been thoroughly understood, discussed or resolved. What would be done then, once there was no place for sale of calves to Kauai beef ranchers? Does HDF propose to start Veal production??? or just euthanize the calves, or ship them for pet food (that certainly would not be economical or ethically acceptable)?

I find so many insufficiently answered or unanswered questions, and it seems HDF continues to keep from dealing with the truth. I certainly hope that the EIS will stand for revealing the truth of HDF’s project and the consequences of its practices...most certainly an unbiased dairy scientist must be enlisted to reveal what is to happen for the EIS to be accurate and of any worth.

aloha, Michele Olry
To whom it may concern,

I am writing regarding why the selection of the location of Maha’ulepu by HDF and Grove Farms to put an industrial size dairy is unacceptable. I question seriously the facts being used to make the decision of the suitability of the proposal to put even just the initial herd of 600 dairy cows, let alone the soon to be 1,000 plus as planned.

I have lived on Kauai for over 40 years and have a background in animal science and veterinary medicine. We have raised horses, cattle, goats and various livestock at several locations around the south of Kauai. The soils are notorious for producing poor quality grasses, and that compact and erode easily due to the clay composition. Caring capacity for livestock is at best 1-2 animals per acre, rotating constantly to keep pastures in good shape, reduce parasite and manure loads. During heavy rains, typical in the wet season, animals quickly tear up the soil and grasses with their hooves and must be removed for the grasses and soil to recover, and to prevent hoof rot. These facts are being grossly overlooked and inadequately addressed in the HDF plans.

The Maha’ulepu location proposed for HDF’s huge dairy herds also has the same problem. In the last 10 years I have worked to assist with the care of marine species, primarily endangered Hawaiian monk seals and sea turtles. On many occasions these endangered species have pupped and nested on the Maha’ulepu coast from near the Gillin house (in 2004) and east to Kamala point. On several years I had experienced rainstorms that lasted several days, causing flooding of Maha’ulepu valley. During those storm events, Grove Farm locked their gates due to the danger of flooding and the high level of water making it dangerous for the public to drive on the roads.

When this has occurred (I remember most recently March 7, 2012), the floodwaters collected in such torrents, that the roads became like rivers to the ocean. It was necessary to use the DLNR DOCARE vehicle, a huge truck with high suspension to get to the beach to collect a dead seal that day. These rain events have happened at least 3 times that I can recall in the last 10 years only, and have caused the removal of dirt to the roads that Grove Farm has sometimes graded, leaving for the last 3 years sharp rocks along most of the south portions of the road. I say this to point out that HDF and Grove Farms has somehow overlooked these weather events and consequences in their future plans for the industrial size dairy and do NOT address this sufficiently in their plans, due to lack of facts. These rains will occur and the flooding that ensues will cause the water/sewage run off to course down the roads, downhill to the ocean, thereby polluting pristine, critical habitat for endangered species, the marine reef environment and for humans as well.

With any rain event, the runoff comes down the stream, turning it brown with sediment, and forms a discharge out into the ocean and the reef, it most often smells foul, unlike most streams on Kauai, with flooding and sediment plumes out into the ocean. The currents carry the runoff to pollute the shore break where people surf, and often carries it to the west. Adding to this already polluted stream the runoff of manure and cow urine is unthinkable!

I have lived and worked in locations near dairies, in central California (Tulare) and parts of Washington (Vancouver) and these large dairies produce so much effluent of liquid manure and associated gasses, that it is almost intolerable to be within a couple of miles of them due to the stench (this even in progressive dairies that use the methane to produce energy on the farms). I cannot imagine a more destructive type of agricultural practice to locate in the scenic, pristine, culturally and environmental sensitive location of Maha’ulepu valley.

I support agriculture and I find it increasingly sad to see such poor choices for land use of Kauai (this over the years means over development for tourism). I cannot highlight enough the lack of awareness, planning and concern to the impact of water and air quality if HDF is allowed to put an industrial dairy in Maha’ulepu. Several years ago, Grove Farms had proposed small farms to produce local vegetables and fruits, something that is sustainable and good for Kauai’s environment and its’ inhabitants (human and wildlife). What happened to that plan? The milk plan is fraught with all sorts of unmentioned problems from bacterial and medical contamination to pollution and parasites to water, land and air.

A small dairy may be permissible, but not the industrial sized dairy that HDF and supporters have as their goal. I cannot fathom in this day and age, with the scientific knowledge and optimum land use practices that we have, why we on Kauai would allow such an unacceptable use of Kauai’s unique and valuable places like Maha’ulepu? I hope and believe that the EIS will reveal this, as well as the investigations of the Department of Water and Health.

As a side, or solution, why not consider coconut milk??? It is economically, and environmentally more acceptable, as well as it is more healthy for humans (certainly sells for more per pint) and would not require the destruction of Maha’ulepu or Kaua’i as a whole.

Sincerely,

Michele Olry
To whom it may concern,

I am writing regarding why the selection of the location of Maha’ulepu by HDF and Grove Farms to put an industrial size dairy is unacceptable. I question seriously the facts being used to make the decision of the suitability of the proposal to put even just the initial herd of 600 dairy cows, let alone the soon to be 1,000 plus as planned.

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Sincerely,

Michele Olry
May 26, 2016

Michele Olry
3954 Kiani Street
Koloa, HI 96756
m.olry@hotmail.com

Subject: Hawai`i Dairy Farms Environmental Impact Statement Preparation Notice
Māhū`ulepū Road
Kaua`i, Hawai`i

Dear Michele Olry:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai`i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai`i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhū`ulepū Valley on the island of Kaua`i to produce fresh, locally available nutritious milk for Hawai`i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet.

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The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhū`ulepū site on Kaua`i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobes”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the
energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high-quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for Hawaii is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā‘ulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawaii’s new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd. Heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

**SOILS:** Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainfall for use during drier periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrient and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soils conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawaii at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

Soil conservation is a core principle behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soils Resource Report for Island of Kaua‘i, Hawai‘i.” The report was generated from the USDA NRCS website, which allows any internet user
to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

**NATURAL HAZARDS:** The potential impacts of natural hazards are evaluated in the Natural Hazards: Section 4.6 of the EIS. The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalihi Clay at 32 percent of the soil volume, which is typical for low-lying areas. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive growth throughout the establishment and establishment of the dairy. Laboratory analysis of soil samples collected in 2014, performed by Soil, Plant, and Wildlife (SPAWL), was used to identify the soil type, pH, phosphorus, potassium, calcium, magnesium, and nitrogen concentrations. The soil salinity and sodicity to provide for future monitoring of soil health with the potential to offset up to one-third of the annual increase in atmospheric carbon.
Mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

AIR QUALITY: As part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy operations include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day. Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the
background concentration of particulate matter (both PM\textsubscript{10} and PM\textsubscript{2.5}) measured on
the island of Kaua'i, and the total concentration was compared to the State ambient air quality
standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM\textsubscript{10} is 2.01 μg/m\textsuperscript{3}, well below the State standard of 150 μg/m\textsuperscript{3}. The estimated concentration for PM\textsubscript{2.5} is 0.23 μg/m\textsuperscript{3}, well below the Federal standard of 35 μg/m\textsuperscript{3} (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odor emissions for dairy facilities and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity/mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670 feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the committed expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching residential or agricultural areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

**ALTERNATIVES:** As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawaii Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation designation, would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. The alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to
produce 10 percent of the State’s fresh milk demand thus reducing
dependence on imported milk (Objective 1). This alternative, however, would
not reduce reliance on costly imported fertilizer and feed (Objective 2); grow
local, quality grass as a primary feedstock (Objective 3); and would not utilize
100 percent of manure on site as nutrients to grow forage for dairy cows
(Criterion 4).

- None of the alternatives would secure a dairy location that meets the
requirements for a pastoral, pasture-based grazing dairy: sufficient
contiguous land area; available long-term land tenure; adequate potable water
supply; suitable soil properties; gentle slope conditions; and accessibility
(Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term
employment in the agricultural sector on Kaua‘i in a wide range of positions
including pasture agronomy/soils science, environmental resources
management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food
production utilizing Important Agricultural Lands, demonstrating the
importance of long-term agricultural leases and capital investment for
agricultural infrastructure, water systems and support facilities. (Criterion 3).
However, after years of trying, it appears there was limited interest in such a
venture.
- Finally, addressing the range of potential environmental impacts (natural,
cultural, social and economic) (Objective 8) the two alternative development
scenarios would generate fewer beneficial impacts and produce impacts that
could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of
Hawai‘i Dairy Farms, was determined to be the most viable option and is the
preferred alternative. Of all the alternatives considered, this is the only approach that
achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy
operation in Hawai‘i, with the capability to provide more than 1,000,000
gallons of the fresh milk demand, reducing dependence on imported milk
(Objective 1).
- The planned dairy location meets the requirements of minimum land area,
soil properties, slope conditions, water supply, land tenure and availability,
and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the
agricultural sector on Kaua‘i, including pasture agronomy/soils science,
veterinary and animal husbandry, environmental resources management,
milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3)
will occur with the proposed action, demonstrating the importance of long
term agricultural leases, and the ability to draw capital investment for
agricultural infrastructure including water systems and support facilities
(Criterion 3).

This response letter accompanies your copy of the Draft Environmental Impact
Statement (EIS). The Draft EIS is available on the OEQC website at the following
URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

Jeffrey H. Overton, AIA, LEED AP
Principal Planner
February 22, 2015

Group 70 International, Inc.
Attn: Jeff Overton
925 Bethel Street, 5th Floor
Honolulu, HI 96813

Dear Mr. Overton,

We have been homeowners on Kauai, in Kahala at Poipu Kai since 1996. The life on Kauai is second to none, except now there is the issue with the proposed dairy farm in our backyard.

Our home away from Kauai is Wisconsin and we have plenty of cows. The issues pertaining to dairy herds has been an issue in our home state for many years. The dairy industry in Wisconsin and in other parts of the United States has been changing, and the environmental concerns those changes pose.

With this increased concentration of milking cows comes a corresponding concentration of manure production. And what happens to this manure is at the heart of the pollution issues surrounding the dairy industry.

In Wisconsin, several dairy operations are now facing opposition to plans to expand their herds. Porous karst soils in the parts of Wisconsin where a significant portion of dairy expansion is occurring present some unique environmental issues. Run-off from dairy farms and other agricultural activities has seeped into aquifers and elevated levels of nitrogen, in some instances to unsafe concentrations; in one recent case, the Wisconsin Department of Justice levied a $65,000 fine against a dairy operation for contaminating groundwater.

Similar issues will face the Poipu area should this dairy farm be permitted. The economic effect on ours and neighbors investments will be in jeopardy. Not to mention the many local merchants that have expanded their businesses to the Poipu area.

We strongly request that the dairy farm proposal be denied. Our request needs to be addressed and answered by the EBs.

Aloha...

Dick & Maria Olson

Dick: 414-559-5323 (DickOlson@earthlink.net)
Maria: 414-979-7577 (MariaEOlson@earthlink.net)
In this way, "poorly drained" soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than "well drained" soils (Yost, 2016). As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soils at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai‘i’s soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as "poorly drained", and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus, calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas "drainage" refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrate and nitrites to gaseous forms, which reduces the potential for impacts on waterbodies.
HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths - as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipu region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.98 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no
animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua’i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua’i will increase county-wide by 17,300 residents by 2030. The South Kaua’i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua’i region (the Kōloa - Po‘ipū - Kalaheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua’i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwhi Cave Reserve in April of 2014. The group reported high levels of enterococci to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococci in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Library" (http://health.hawaii.gov/cwb).

Long-term Operations: Siltfences and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Hanalei District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected
from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhū'ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po'ipū region were also calculated. Nitrogen input to the marine environment in the Po'ipū region is calculated to be 38,510 pounds annually, or 35 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downstream from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Wainiha Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua'i community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai'i Dairy Farms": http://tinyurl.com/GEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
February 23, 2015 by US mail and by email: cpo@doe.hawaii.gov and HDF@Group70int.com

To: Laura McIntyre
State of Hawaii, Department of Health
Environmental Planning Office
1250 Punchbowl Street
Honolulu, HI 96813

and

To: Jeff Overton
Group 70 International, Inc.
925 Bethel St., 5th Floor
Honolulu, HI 96813

and

To: Hawaii Dairy Farms, LLC.
P.O. Box 1690
Koloa, HI 96756-1690

From: Lorraine Osterer, 1640 Makanui Road Unit 2, Koloa, Hawaii, 96756

Because the EA was skipped, and because many Kauai residents have been misled to believe the Proposed Dairy is "a done deal", I suggest that further efforts should be taken to inform all Kauai residents of the EIS process with correct facts and figures, some of which are in contrast with previous reports, public meetings and advertisements by Hawaii Dairy Farms, LLC (HDF). I suggest the comment period be continued.

I represent my 93-year-old Mom and myself as permanent residents of Koloa, and would like you to consider the retired, less mobile seniors of this community, whose health and security would be impacted by a nearby Dairy. I am invested in seeking the truth, to protect my lifelong dreams, health and equity, after 40 years of sacrifice to afford to live here. I would like to participate in the entire EIS process and related evaluation, expecting we deserve protection by our public processes.

Impartial Studies are needed: One of my first concerns is for a non-partisan independent research firm to conduct the EIS. Group 70 International is an architectural design company with vested interest to design the buildings of the project. Since there is a current conflict of interest, I seek for a determination whether this company should conduct the EIS, and suggest that their financial involvement would not insure an unbiased report. Alternatively, the research and reporting consultants should be selected by agreement with other interested parties, including Department of Health (DOH) and Friends of Mahalupeu.

Site Location: The Mahalupeu location does not seem to meet the needs for soil absorption or water supply, as referenced in section 3.13 of the EISPN. NRCS soil studies show it is mostly clay. The water supply is questionable and needs legal review, since the 1957 Huleia diversion seems to be in violation of state public trust doctrine and Hawaii State Constitution, and that water flow was agreed to be returned to its former natural state. An acceptable alternate location should be found for evaluation in the draft EIS. Since the same owner has evidently purchased the only other Hawaiian Dairy, the EIS should evaluate why he cannot simply expand the herd at that site or others on the Big Island.

Public Health Regulation: Referring to the EIS Preparation Notice, concerning DOH regulatory reviews at the bottom of p. 2-2 in section 2.3, the 699 cows are all pregnant, producing milk, so how long before the first calf is born and the herd exceeds the existing permits? HDF's July 2014 plan refers to a 2000 cow herd. A Waste Management plan for a large CAFO should be required for DOH review in the draft EIS.

Public Health Issues and Water Quality: The bottom of page 3-3 states there are no existing hazardous elements, however the current measured Waipooi stream pollution levels are hazardous. These independent tests results are available to the public at the friendsofmahalupeu.org website and Surfrider organization. Enterococcus bacteria for the summer sampling is 514/100 ml for Gillin's beach and 880/100 ml for Waipooi Stream, dangerously above State standards (35). The yearly average from 19 samples of the Waipoi stream is 9,100, a constant source of pollution into the ocean. Since this significant data was omitted, can we count on complete accuracy of an EIS report by the same methods of the same company? How can the nearby wells be protected? Groundwater studies indicate the wells will become polluted. The risk to the entire Kauai fresh water supply is extremely high with the plan to pump thousands of pounds of manure sludge from the collection pond down slope to Block H, nearest the wells. Nitrate toxicity will also result from runoff. Additional diseases can result from transmission by wind, insects, and runoff. The EIS must thoroughly evaluate risks to air, ground water, drinking water, and ocean pollution, with preventative actions, corrective actions, and bonds to ensure public protection.

Degradation of Environmental Quality: The proposed Dairy site can be seen from my house, which is about 2 miles downwind. We are already affected by winds carrying the GMO chemicals from the same area. Will the EIS evaluate the chemical affects of nearby GMO crops on the Dairy and milk produced? The smell of cow manure and flies would also be carried by the strong winds so common to this area. Unlike the Molokai dairy in summer, where one could drive by and hold your nose temporarily, we will not be able to escape the smell from a Mahalupeu dairy operating 24-7 all year

Substantially affects a rare threatened of endangered species or its habitat: Pristine shoreline, monk seals, and other endangered species would be affected. The EIS must consider the endangered species and in particular, the designated ecologically sensitive marine shoreline.

Environmental and Economic Welfare, Cumulative Effect would be Irreparable Damage: Major properties, such as the Hyatt resort, are already planning to sell if the Dairy comes in, which would start the de-escalation of property values, that have not yet recovered from the previous economic crisis. Based on the information presented in the HDF plan, and documented New Zealand studies, where the climate is more temperate, major pollution is predictable. Our warmer climate, clay soil and slopes will accelerate the process of manure, nitrates and phosphates into the ocean. The NRCS Custom Soil Resource Report Review indicates that the amount of waste cannot be absorbed by these soils. The polluted ocean, flies and odor would keep everyone from enjoying any outdoor activities at the beaches, shoreline, and our own yards.
And Involve Substantial Secondary Impacts: The Dairy effect on jobs and tax revenue will never compensate for the job loss at resorts, and the loss of tourism dollars. A major resort reports cancellations already due to news of the future Dairy. All of us depend on tourism, one way or another.

I believe that shoreline conservation is something we have a right to protect for all and for the future of Kauai. In particular, a Dairy at this location, only 1 mile upstream, causing waste to flow into the westerly current just east of our most popular major beach resorts, would negatively impact the entire Kauai economy.

This project has been advertised as a sustainable project. It is not. The milk will not be processed and stay here on Kauai. Livestock is the most inefficient use of agricultural land for food production. The methane produced by cows far outweighs all other energy conservation methods for Kauai. The methane destruction of the ozone layer, reported as significant over New Zealand, will mean a hotter, dryer climate for Kauai with future drought conditions. Recovery of the climate and the economy would be impossible. The cumulative effect would be considerable deterioration of the environment and conflict with Kauai's long term environmental guidelines in HRS 344, etc. No plan for remediation of pollution has been included, and must also be evaluated in the EIS.

Thank you for your consideration,

Lorraine Osterer
Email: losterer@hotmail.com

May 26, 2016

Lorraine Osterer
1640 Makanui Road, Unit 2
Koloa, HI 96756
losterer@hotmail.com

Subject: Hawai'i Dairy Farms Environmental Impact Statement Preparation Notice
Mihā'ulepō Road
Kaua'i, Hawai'i
TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Lorraine Osterer:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

GROUP 70 OBJECTIVITY: Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai'i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai'i Revised Statutes and the "Environmental Impact Statement Rules" (Chapter 200 of Title 11, Hawai'i Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State and Federal agency. On numerous past EIS projects, the Hawai'i Chapter of the American Planning Association has recognized Group 70's professional work with Chapter awards for excellence in environmental planning. Part of the EIS scoping process involves Group 70's
The pastoral rotational-grazing dairy provides a local feedstock—grass—as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially identified appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāʻulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob,” mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gas irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawaii is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and...
The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance properties and weather conditions. For more information on nutrient balance included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native species will occur as a result of the dairy.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, scattered that nest in upland areas of Kauai may not overfly the site. The endangered Hawaiian goose, which was also seen on the site, is a highly migratory species and is listed under Federal and the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common bird species and terrestrial mammals were encountered on the property. There is no critical habitat, under Federal or the State of Hawai'i's endangered species programs, located onsite. It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. No federal or state listed endangered or threatened species are present on the site.

A study of invertebrate species and pest insects was conducted by Steven Loganberg, PhD, Consulting Biologist in January 2016. The study summarizes the presence of absent or native species associated with cattle control methods. No federal or state listed endangered or threatened species are present on the site.
invertebrate species were noted in the survey of the site. A full report and list of
species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as
bait for invertebrates. The two flies associated with livestock are the stable fly and
the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are
often confused with the house fly. Flies known to exist on Kauai but not seen at
the HDF site include the house fly, the dog dung fly and the chicken dung fly. These
pests are common in areas with high pet populations. It is possible these fly species could
inadvertently be brought to the dairy and utilize manure as a food source. HDF will
prevent and control fly population growth through diligent clean up and sanitation
practices regarding any trash and food waste, as well as through efficient manure
composting practices. A full list of site management measures is provided in EIS
Section 4.11. The project location does not provide any habitat for dro sophila
maquilda, the only Kauai species of native Hawaiian fly listed as Endangered or
Threatened. Native Dro sophila habitat is located many miles away in the high
elevation koa-ohia forests.

Fly populations at HDF will be minimized through a process known as Integrated
Pest Management (IPM). Essentially IPM disrupts reproduction with appropriate
means at key points in the pest’s life cycle. Used in Hawaii for decades, a number of
invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950
to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web
among species.

An especially important insect to minimize fly breeding habitat in manure is the dung
beetle, which buries manure and incorporates it into the soil. Populations of dung
beetles found on Kauai and those species already in Mahu‘ulepü Valley, will increase
with the increased manure food source, thus increasing and speeding breakdown of
manure. Dung beetles are specialists in the very important natural process of
breaking up and quickly recycling bovine manure pads. The behavioral diversity
among dung beetle species will work together to bury dung pats in one to three
days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kula-Poi‘pu region, pest fly populations are dependent upon food and
breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the
region on agricultural lands along Ah Kinoi Road between Kula and Poi‘pu, and it
is likely the livestock-related flies identified at the HDF site occur in this region as
well. Localized controls to reduce pest populations need to address breeding sites in
and amongst the food and animals wastes within the area. These mitigation
measures will make it difficult for flies to breed, and BMPs will be enforced to
address any increase in population, therefore it is expected that the dairy farm will
not significantly affect recreational and resort areas.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawaii Dairy Farms
(HDF) to the existing economy were evaluated in the Draft Environmental Impact
Statement (EIS), including a fiscal impact assessment report completed in April,
2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic
and economic factors, with the complete report in Appendix I.

The HDF project would provide significant benefits through jobs for local
construction personnel and local material suppliers. Such jobs would include
equipment operators, cement workers to lay foundations, metal workers,
carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State
employment multipliers, indirect employment related to Dairy construction
would be expected to average about 16 jobs on Kauai’s, and 8 on Oahu. Construction
employment would be expected to average about 12 jobs per year during the
development period. Thus direct-plus-indirect employment association with
construction would be expected to average approximately 36 jobs, of which 28
would be on Kauai.

The HDF project would contribute to diversification of Kauai’s economy, which is
heavily based on the visitor industry. With only two dairies remaining in the State
(both on the Hawaii Island), approximately 10 percent of Hawaii’s milk is locally
supplied. The HDF project, with an established herd of up to 699 mature dairy cows,
will increase the supply of liquid milk by approximately 1.2 million gallons of
milk annually, a 50 percent increase in statewide milk production. On-going dairy
operations at the committed herd size will provide approximately 16 direct and
indirect full-time equivalent jobs on Kauai’s, including 5 farm jobs and about 11
indirect jobs. An additional 6 indirect jobs related to on-going dairy operations
would be created on Oahu.

HDF is expected to generate a net income of approximately $60,000 to the County
when the 699 cow herd is established. When the dairy has matured to full
production for the 699 cow dairy, net income to the State is calculated at $160,000
annually. With the potential contemplated herd size of up to 2,000 mature dairy
cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be
produced. This would double local milk production currently supplied by operational
dairies on the Island of Hawaii.

Additional employment generated by a possible expansion to accommodate the
contemplated 2,000 mature dairy cow herd is estimated at approximately 3
construction jobs plus 4 indirect jobs on Kauai’s, and 2 indirect jobs on Oahu for a
total increase of 9 jobs. For on-going operations at the contemplated herd size, an
additional 5 full-time farm jobs would be added, with approximately 15 additional
indirect jobs on Kauai and another 8 indirect jobs on Oahu.

The dairy is expected to generate a net additional contribution to the County of
approximately $8,000 for improvements related to expansion for the contemplated
herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the
committed herd size). The State will derive approximately $360,000 annually in
revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated
nuisances that could affect property values as a result of dairy implementation or
operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawaii Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22, and 4.23. The technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

Hydrology: The area’s hydrology is shaped by its geology. The Kolea area was built by Napali formation lavas of the Waimanu volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saposonite, a soft, thoroughly decomposed rock. The Makahae Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kolea series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvial material and lava over the valley floor, and (2) groundwater in the thickness of unweathered, unconfined aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Makahae Valley and the HDF site ranges from 0.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kolea-Poiipi region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Makahae Valley may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the EIS provides further detail.

**REGIONAL WATER DEMAND:** The adjacent, developed Kolea-Po‘ipu region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kolea will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2030, when it is projected to encompass 19.2 percent of the County population. The South Kaua‘i region (the Kolea–Po‘ipu – Kalaehe districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of potable water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**
The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the east that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kauaʻi Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makaawahi Cave Reserve in April of 2016. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data; however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and a area upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauaʻi, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The deme canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people.

Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” [http://health.hawaii.gov/cwb].

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-fee ts from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the potential future contemplated herd, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplemental. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8
inches. Such rainfall events are estimated to occur approximately three percent of
days, or an average of 10 days annually. Per best practices, no effluent application
would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po‘ipū region were
also calculated. Nitrogen input to the marine environment in the Po‘ipū region is
calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of
potential nutrient throughput from HDF. Phosphorus for both domestic wastewater
and landscape fertilization in the region is estimated to be 1,260 pounds annually,
or 14 times greater than the potential discharge from HDF. The nutrient inputs
from domestic uses in the Po‘ipū region are constant throughout the year and no
mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment.** An assessment of groundwater and
surface water interaction with the marine water downgradient from the dairy site
was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the
Waipili Ditch provides the majority of freshwater input in the immediate coastal
area. Water chemistry measurements made by MRCI identified mixing of ditch
water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just
10 days annually from dairy operations will not adversely affect ocean water quality
and the marine environment. The nearshore area is a highly mixed environment
which actively disperses inputs within several meters from shore. Comparing
nutrient constituents in surface water samples taken from the HDF site and the
agricultural ditches down gradient to nutrients sampled in the nearshore ocean
water revealed that indicator bacteria were substantially lower in the ocean than in
ditch. The rapid decrease is likely a result of both physical mixing of water
masses and toxicity from saline water. In any event, the elevated levels of indicator
bacteria do not extend beyond the shoreline. Baseline water quality data and
the surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality
monitoring will be instituted in conjunction with the surface water quality
monitoring to regularly sample and analyze the nearshore ocean waters. The
ongoing testing program will provide feedback to the dairy management team
to help ensure that nutrients and bacteriological constituents are not being released at
levels of environmental concern. Data from the nearshore water monitoring
program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i
community.

**ALTERNATIVES:** As a part of the DEIS, alternatives were evaluated that could
attain the objectives of the action’s purpose and need, and were compared with
environmental benefits, costs, and risks of each reasonable alternative against those
of the proposed dairy project. Further discussion of alternatives can be found in
DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s
purpose and need, and compares environmental benefits, costs, and risks of each
reasonable alternative against those of the proposed action. Additionally,
reasonable land use alternatives that emerged from public input during the project
scoping phase are documented and briefly discussed. The alternatives that do not
meet the project purpose are not advanced for analysis of environmental benefits,
costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative
Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could
attain the objectives of the action, regardless of cost. There is no requirement for the
alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed.
Rezoning the land for resort or residential development, or a potential conservation
condemnation are two uses that were examined and eliminated from analysis.
These options would not be reasonably viable given the existing private land tenure
and existing zoning. Two additional alternatives were considered as reasonable land
uses as they could be permitted within the existing State Land Use Agricultural
District and County Agricultural Zoning District. These options include Agricultural
Park with Processing Center, and development of an Agricultural Subdivision. The
alternatives were examined and eliminated from further analysis, however, as they
would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose.
Rigorous exploration and evaluation of the environmental impacts of the
alternatives, including those that might enhance environmental quality or avoid,
reduce or minimize some or all of the adverse environmental effects, costs and risks.
These alternatives include: (1) the development of a Conventional Feedlot Dairy (a
non-pasture-based dairy) at the same location, and (2) development of the Pasture-
Based Dairy at an Alternative Location on Kaua‘i. The alternative of "No Action" is
also evaluated. One additional alternative, considering a scenario for the Dairy
Products at an Off-Island Facility, was evaluated.

Although the alternative approaches are potentially reasonable uses under existing
zoning and neighboring uses, they each fail to comprehensively fulfill the
requirements defined with the five established Evaluation Criteria (IV). The
essential differences as compared to the proposed action are highlighted in the
following statements.

- Only one of the alternative actions (conventional feedlot alternative) would
  create a commercial scale dairy operation in Hawai‘i, with the capability to
  produce 10 percent of the State’s fresh milk demand, reducing dependence on
  imported milk (Criterion I). This alternative, however, would not be pasture-
  based and could negatively affect air and water quality.
- None of the alternatives would include a dairy location that meets the
  requirements of a pastoral, rotational-grazing dairy minimum land area, soil
  properties, slope conditions, water supply, land tenure and availability, and
  accessibility (Criterion I).
• One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, livestock management, environmental resources management (Criterion 2). However, the purpose and need to provide fresh fluid milk would only be met with the Conventional Feedlot Dairy Alternative.

• The alternative for Agricultural Park could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). After many years, Grove Farm encountered limited interest in such a venture.

• Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Criterion 5) the four alternative scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast, the planned agricultural operations of Hawai‘i Dairy Farms, were determined after substantial analysis to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the five Evaluation Criteria (Section 2.3.4):

Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

• The planned dairy location that meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

• The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soils science, livestock management, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

• Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

• Address the range of potential environmental impacts by utilizing 100% of manure as natural fertilizer to grow the majority of food for cows (Criterion 4).

The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

• Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Criterion 5).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AEP, LEED AP
Principal Planner
Dear Jeff,

I am writing to express my deep concerns about the Mahalapu Dairy HDF proposed dairy on the south shore of Kauai.

It is just the wrong location for such an operation. The site makes no sense. So close to a world-renowned beach resort area and in such a special valley with sacred historic significance... air stench, land degradation, water pollution, biting flies... is this just a strategy for the owner to reduce property tax?

Air, land, and water quality will be irrecoverably degraded. Water quality in the streams is already a concern so the dairy will undoubtedly pollute the stream beyond what any of us can ever imagine. It defies logic. We understand the State wishes to be more self-sufficient with local agriculture production but the costs outweigh the benefits.

Please do what you can to stop this dairy before it is too late.

Sincerely,

Patty Oxford
2229 Iukika Place
Koloa, HI

Pattygogirl@gmail.com

May 26, 2016

Patty Oxford
2229 Iukika Place
Koloa, HI 96756

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Mi'ahulapua Road
Kaua'i, Hawai'i

TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Jeff,

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Mi'ahulapua area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are...
HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are expected to average about 12 jobs per year during the construction period. This direct-plus-indirect employment association with the HDF project would contribute to the economy of the area. HDF will provide approximately 16 direct jobs, which will be created on O'ahu. An additional 6 indirect jobs related to ongoing dairy operations will be created on O'ahu.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means. Natural enemies include natural enemies such as lady beetles, parasitoid wasps, and predatory mites. Lady beetles, which feed on aphids and mealybugs, will increase among species. As an especially important insect to minimize breeding habitat in manure is the dung beetle, which feeds on dung and incorporates it into the soil. Populations of dung beetles found in manure are estimated at 4 million (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai'i.

Additional employment associated with the HDF project is expected to average approximately $8,000 for improvements related to expansion for the committed 2,000 mature dairy cow herd. The State will derive approximately $6,000 annually in property values in the area. The HDF site is expected to generate a net income of approximately $60,000 to the County and a total potential income of $76,000 total versus $68,000 for the committed herd size of up to 2,000 mature dairy cows ($76,000 annually in property values in the area). The potential impacts of Hawaii Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

WATER QUALITY:

Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts on the proposed Hawaii Dairy Farms (HDF) project. Results of technical studies and the findings of this Draft EIS show no unmitigated impacts from the proposed Hawaii Dairy Farms (HDF) project to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.
and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23, the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

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The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evaportranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāulepū 14 well and the County’s Köloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāulepū Valley, HDF established a 1,000-foot setback surrounding the Köloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

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The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāulepū watershed.
The HDF site is located on the bottom-land of the upper Māhāulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha'upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey of the Māhāulepū and adjacent watersheds." DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Library" (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 423 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget as two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po'ipū region were also calculated. Nitrogen input to the marine environment in the Po'ipū region is estimated...
(SAAQS) that are as strict or, in some cases more strict than the potential nutrient throughput from HDF. Phosphorus for domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, construction activities at the property line.

Greenhouse gases related to dairy cows include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure. Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site. Dust will be generated as cows move along soft limestone walkways that connect paddocks and lead to and from the milking parlors. Potential fugitive dust emissions are generated during unloading and reseeding of the non-pasture areas used by cows at HDF. Results were added to the surface and marine water impact report included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality. The estimated concentration for PM10 is 2.01 μg/m3, well below the State standard of 150 μg/m3. The estimated concentration for PM2.5 is 0.23 μg/m3, well below the Federal standard of 35 μg/m3 (see Draft EIS Section 4.19 and 4.25).

AIR QUALITY:

As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind patterns and dispersion modeling of potential dust and odor impacts. Local weather data was used in conjunction with the AERMOD modeling technical report can be found in Draft EIS Appendix I.
at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the DEIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

**ALTERNATIVES:** As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai'i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements:

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).

- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate, potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing important Agricultural lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However after years of trying, it appears there was limited interest in such a venture.

- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that
could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai‘i Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

[Signature]
Aloha please find my comments attached as a PDF file

Mahalo.

John Patterson

Comments and Questions for the Hawaii Dairy Farms Draft EIS

Feb 22, 2015

Aloha,

My comments and questions will be direct and to-the-point. The questions that require an answer are clearly shown by bold italics. This project proposed by Hawaii Dairy Farms (HDF) is likely to have impacts for at least four of the criteria listed of the thirteen categories of Significance Criteria identified in HAR Chapter 200.

Specifically they are:

7. **Involves a substantial degradation of environmental quality:**

Dairy farming has been shown in many instances to cause significant environmental impact. These impacts are well-known and well-documented. Dairy farms located in coastal marine areas are especially prone to cause environmental harm. A good example of this was a study published in Scotland in 2008 showing the direct effect a dairy had on causing fecal coliform counts to close nearby bathing beaches (Ref 1). There are numerous popular beaches within 750 meters of the HDF site. Furthermore, dairies have been shown to cause harm to local water supplies. Recent examples of dairies degrading the groundwater and nearby environment are common: in Oregon, Wisconsin and California have all had recent examples where dairies were cited and fined for damages caused to water resources.

The EIS for HDF will need to show how the plans proposed here are substantively different than those shown to fail in other dairies such as in New Zealand or the US Mainland where environmental harm has already been established. Indeed, HDF has hired a person from New Zealand to manage the dairy and to implement “New Zealand Dairy Practices”. Thus looking carefully at the results of these practices is warranted here before HDF begins operations.

Dairy farms in NZ have decimated several river systems throughout the country such as the Waikato River. In fact the practices earned a name and a special Wikipedia entry under “Dirty Dairying” (Ref 2). The magnitude and significance of these impacts can be seen through the legislative actions taken by the NZ government. There, dairy farming practices had such detrimental impacts on the environment that the Government passed the “Dairying and Clean Streams Accord”. Despite these measures, there are still many signs that dairy farming is causing ecological harm in NZ.
New Zealand - just like Kauai - has a "pristine environment" brand to maintain to continue receiving its main form of income - tourism. Any degradation of that image can cause significant economic hardships.

I used the guidelines from NZ’s one dairy industry to see where they would locate a dairy. Looking at page 19 from DairyNZ “FDE Farms Guid to Pond Design” we see the number one consideration when locating an effluent pond is “proximity to coastal marine areas”.

If this is the number one consideration, then why is HDF being allowed to build their effluent ponds less than 1.5 miles from a pristine undeveloped coastal area?

What is the total 24-hour rainfall amount that they use as a number to calculate effluent pond size?

The effluent ponds shown here are for the 699 cow operation - would another EIS be required to add an additional 1301 cows as proposed for the future? When will HDF decide to add more animals?

How does the regulation change when the 700th cow is born into the herd?

What happens to the calves that are born on HDF?

8. Is individually limited but cumulatively has a considerable effect upon the environment or involves a commitment for large actions

In fact, the actions of HDF will impact the environment primarily in this way: no one day of manure spraying will ruin water quality, nor kill endangered spiders, nor ruin the nearby reefs - it is the repeated small impact of these actions that will result cause potential irreparable harm. This harm will take the form of increased nitrogen and phosphate levels in nearby waterways, increased levels of pathogens in nearby streams, and this raises the possibility of these pathogens getting into the public water supply located less than 1/2 mile away. Any reputable environmental impact statement must clearly address this issue. High levels of N and P are something even grade-schoolers learn about as a result of this type of operation. These lead to algal blooms, lowered oxygen levels in the waterways, and other well-documented effects.

At present what plan does HDF have to prevent sprayed effluent from the southern boundary of the property from running into the stream that drains this entire pasture?

HDF told me that they would not spray “if rain was predicted within the following 2 days” - this implies to me that they realize that run-off from their spraying could cause harm to the nearby streams.

However on Kauai, rainfall cannot be predicted with any type of long range precision - what expertise do HDF personnel have forecasting rain in this area? It is common to have short heavy downbursts that will cause any recently-sprayed manure to immediately run into the drainage streams. These lead directly to the ocean near Gillian’s Beach.

How will HDF monitor and mitigate the effects of their run-off in this type of scenario?

If they install water quality monitoring wells as mentioned, what thresholds will be used to determine the need to cease or alter operations at HDF?

With the likelihood of unexpected heavy rainfall events leading to run-off from the pens to flow into the nearby streams and then directly into the ocean less than 900 meters downstream, the EIS should propose the alternative location or the no-action proposal.

With the possibility of unexpected heavy rainfall events leading to an overflow of the effluent pond into the nearby streams and then directly into the ocean, the EIS should propose the alternative location or the no-action proposal.

9. Substantially affects a rare, threatened, or endangered species, or its habitat

At least one highly endangered species lives approximately 500 meters from HDF property line and adjacent to the stream that carries the effluent into the ocean. That species is Adelocosa anops The Kauai Cave Wolf Spider. I note that no mention of this is made in Section 3-2 of HDF EISN, though this endangered spider is well-known.

How can HDF explain/justify that their frequent spraying of manure and effluent in the adjacent plots will not lead to further threat to the habitat of this spider?

With the proximity to both the sinkhole with its rare arthropods and potential cultural artifact site, why would you not accept the alternate site proposal?

What has USFW said regarding this endangered species and the dairy's location?

Use of parasitic wasps to control fly populations on HDF:
No mention of this is made whatsoever in the HDF EISN, however several times they have mentioned to the public the planned use of parasitic wasps to control fly populations.

Is HDF still planning to use parasitic wasps to control flies?

If not, how will they control flies?

If they use parasitic wasps or other biological control vectors - will these be native species? Or non-native species with the potential to interact in unknown ways with the fauna found on Kauai? Are the EIS authors aware of a SCIENCE paper from 2001 that showed the invasive spread of parasitic wasps into Kokee and the Alakai Swamp region and that the majority were seen to be introduced species for biological control?

The authors state:

“Although it is impossible to fully understand the dynamics of this system after only 2 years of study, there is little doubt that the community structure has been altered considerably from its original state.” (Ref 5)

Any such biological controls must be fully addressed in the draft EIS.

10. Detrimentally affects air or water quality or ambient noise levels

Numerous studies have repeatedly confirmed the presence of pathogenic organisms in cow manure. These organisms may sprayed each time the pivots operate. They include anthrax, Brucellosis, salmonella, and listeria (ref 4). These airborne pathogens can travel hundreds of meters in the wind and land in unknown areas to cause well-documented harm or disease.

How will HDF mitigate the spread of these pathogens into the neighboring populated areas?

With the main drinking water well for the area located only 1/2 miles from the HDF boundary, and thousands of people dependent on this water source, why would the EIS not recommend the alternative site option?

Dairy farms use a lot of fresh water in their operation.

What is the forecast amount of water to be used daily by HDF?

What is the source of fresh water to be used by HDF?

Dairies are well-known to smell bad and for this smell to travel for up to several miles downwind. Strong trade winds (15-25 mph) blow from E to W on the property for many months each year. Flies are also a major problem both for the dairy and the adjoining land owners.

How will HDF control the smell of sprayed manure from drifting west into the prime tourist area on Kauai?

What actions will HDF take if numerous complaints are made to local hotels and restaurant owners if there are flies and or noxious odors?

Thus there are many reasons to believe this EIS should lead to a no action or alternative action decision. These include:

- proximity to a pristine coastal area
- potential harm to nearby waterways and drinking water supplies
- upwind proximity to a primary economic/tourist area
- potential harm to endangered species
- small economic benefit to the Kauai community
- need to import 30% of the feed from off-island, therefore negating the USDA's criteria for using the marketing term "grass-fed"

In conclusion, to deny the longterm detrimental effects seen many times before with this type of intensive dairy operation would be environmental blindness. To place such an operation so close to pristine reef and ocean is irresponsible stewardship of the 'aina. It would be disheartening to see good people, many with PhDs in biology and environmental sciences decide to green-light a project like this.

I urge the EIS to elect for either the alternative location or the no-action option.

Sincerely,

John Patterson Ph.D., UT Austin, Department of Zoology
Wailua, Kauai
Dear John Patterson:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhū‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.
The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a "zero-discharge, grass-fed dairy". The term "zero-discharge" under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows' manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term "zero discharge" as it was construed as no nutrients into the system.

The term "grass-fed" was used in the HDF EISPN. This term was used to identify HDF's intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd's diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of "grass-fed". The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of "grass-fed", the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area "footprint" will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1. Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd's primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient "dry matter" grass yields essential to a cow's diet. Additional project-specific trials at the Māhāʻulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows' diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as "mobs", mimicking the natural social order of bowies. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows' primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waiau Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy
During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua’i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhūʻulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai’i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a breeding/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s wellbeing. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

**NATURAL HAZARDS:** The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhūʻulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai’i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami inundation zone. The Kaua’i and N’Ihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands. Although they occur infrequently, Kaua’i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhūʻulepū region during and following the hurricanes that affected Kaua’i in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhūʻulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua’i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

**INVERTEBRATE SPECIES:** A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, Ph.D., Consulting Biologist. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhūʻulepū area, as well as the parasites and predators on site that control those species. Fieldwork was conducted during September 15-16, 2014. The entire study is included in Draft Environmental Impact Statement (EIS) as Appendix B.

**CAVE AND LAVA TUBE INVERTEBRATES**

There are no known caves or lava tubes found at or adjacent to the dairy farm property. The Kōloa Lava Tube System, which provides habitat for two endemic cave species, the Kaua’i and N’Ihau cave wolf spiders, is located several miles away from the dairy farm property. Both invertebrates are listed as endangered under the US. Endangered Species Act. Not all caves in the Kōloa area contain these invertebrates, as many do not contain the optimal climatological conditions required by these organisms. Neither the botanical and fauna survey nor the invertebrate survey revealed any evidence of lava tubes or caves on the property, and no such features have been reported for the area near the Hawai’i Dairy Farms (HDF) site. Thus no cave invertebrate species will be affected by the dairy farm.

**INTRODUCED PREDATOR INSECTS**

An invertebrate study of manure-associated insects was conducted for the Draft EIS. The study included a field survey that used manure from an adjacent beef cattle herd as a lure, and determined flies and other manure-related insects currently present at the HDF site. Pest insects such as flies can negatively impact livestock health and production, and are therefore actively managed to prevent stress and loss of productivity at dairy operations.
At the HDF site, two common flies were identified: the stable fly and the horn fly. Both of these flies are widespread throughout the Hawaiian Islands. The greenbottle fly was reared from manure taken back to a laboratory following the field survey. Additionally, flies known to exist on Kaua‘i but not seen at the HDF site during the survey were identified and include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations.

In response to cattle-related insect pests, numerous species known to compete with the pests were introduced to Hawai‘i between 1898 and 1982. Twenty species of predators and competitors to the horn fly were successfully established during that period. Cattle egrets break up dung patties while searching for prey, and were introduced to Hawai‘i in the late 1950s to control cattle-associated insects. Extensive introduction of dung beetle species resulted in 14 dung beetle species becoming established on Kaua‘i.

A healthy population of dung beetles can bury a dung pat in one to three days, which disrupts reproduction of flies such as the stable fly and horn fly. The stable fly requires approximately 21 days within the dung patty for the immature life stage (egg to pupa) to survive; the horn fly takes 10 to 20 days from egg to adult. Incorporation of the manure into the soil profile by dung beetles removes the habitat these flies require to complete their lifecycle. Research shows that 95 percent fewer horn flies emerged from dung patties containing a dung beetle species that has been identified at the HDF site. Proven control methods for the stable fly include parasitic micro-wasps and spreading out manure.

Among the invertebrates previously introduced to Hawai‘i to combat livestock-related flies are extremely tiny parasitic wasps that prey on various fly species. The adult wasps could be described as the size of a gnat. Using an ovipositor – described by lay people as a “stinger” – the female lays eggs in the larvae or pupa of flies. The male wasp has no such “stinger”. See Draft EIS Section 4.11 for a photo providing scale for these tiny, non-stinging wasps.

To minimize potential establishment of pest flies or other insects, food waste generated during the construction phase will be bagged, covered, contained and disposed of in order to limit possible breeding habitat for flies. Inspections of building materials for ants or other insects will be conducted to prevent introduction of new pests to the HDF site. Short-term controls, including mechanical methods (e.g. sticky tapes or ribbons in the milking parlor, or traps with or without attractants) and chemical methods may be used to prevent short-term spikes in pest populations.

Insecticides and herbicides are non-discriminatory and kill beneficial as well as pest insects. Beneficial insects include primary decomposers such as earthworms and dung beetles, and pollinators including bees. Should chemical control be needed for short-term spikes in pest populations, application would be by those qualified, and in accordance with regulatory labeling requirements. HDF will implement long-term integrated pest management, which utilizes knowledge of the ancient food web among species by disrupting the manure habitat required to complete the fly life cycle. HDF and other ranchers on Kaua‘i may choose to engage with the State Department of Agriculture to translocate dung beetle species already introduced on Kaua‘i to Māhāulepū and other areas where manure-related flies may be a problem.

IMPACT OF SPRAYS ON BEES
Beneficial insects include primary decomposers such as earthworms and dung beetles, and pollinators including bees. Honey bees are an essential part of any agricultural ecosystem, and were observed on site during the invertebrate species survey. Pesticides and herbicides can reduce populations of beneficial insects, which is why HDF will utilize an integrated pest management approach.

It is expected that honey bees will visit water sources set up for the HDF herd. Preventative measures will be built into any open water source to prevent bees from being trapped, and HDF will contact local beekeepers for advice regarding any bees or bee colonies encountered on site. Safe application practices for any unavoidable herbicide or pesticide will be utilized in order to narrowly target the correct pest species without harming other insects and animals in the area. Anyone using herbicides or pesticides will be properly trained and informed, and if a honey bee colony location appears to be a danger to workers or cattle, or to be in danger itself, a local beekeeper will be contacted for advice and removal.

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhāulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila musaphila, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native drosophila habitat is located many miles away in the high elevation koa-‘ohi‘a forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate
means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhā‘ulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pads in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōloa-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ah Kinoiki Road between Kōloa and Po‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animals wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

### DEMOGRAPHIC AND ECONOMIC
The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (DIES), including a fiscal impact assessment report completed in April, 2016 by Plach Econmics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J. The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

### WATER QUALITY
Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawaii Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

### GROUND WATER

**Hydrology**: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimoa volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is overlain by highly weathered lava at a shallow depth by secondary eumorphs of the Kōloa...
series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā'ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā'ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (mgd), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlors and for milking operations; another potable water use will be for livestock parlors and for milk operation, and another potable water use will be for livestock

established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Poipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i region (the Kōloa - Poipū - Kalahoe districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā'ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā'ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā'ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hā'upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā'ulepū Road. This ditch, named Waipōlū Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and
prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waipioii Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waipioii Ditch, or of surface waters in the Māhāulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waipioii Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāulepū and adjacent watersheds. DOH conducted water sampling within the Waipioii Ditch and area upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waipioii Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāulepū Valley. The dene canopy along the makai end of Waipioii ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waipioii Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” [http://health.hawaii.gov/cwb].

Long-term Operations: Setsbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, US. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fenceline and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels would occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year) and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōkua-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 14 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Maritime Research Consultants, Inc. (MRCI). Surface water from the Waipioii Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.
The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day. Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking session.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.
Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual odors odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawaii Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Kymry Perez
1649 Kelauika Street
Koloa, HI 96756
Kymry@Kymry.com

Subject: Hawai'i Dairy Farms Environmental Impact Statement Preparation Notice

Dear Kymry Perez:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

GROUP 70 OBJECTIVITY: Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai'i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai'i Revised Statutes and the “Environmental Impact Statement Rules” (Chapter 200 of Title 11, Hawai'i Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State and Federal agency. On numerous past EIS projects, the Hawai'i Chapter of the American Planning Association has recognized Group 70’s professional work with Chapter awards for excellence in environmental planning. Part of the EIS scoping process involves Group 70’s
experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai’i Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai’i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J. The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairy herds remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawaii Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Nāpali formation lavas of the Waimānalo volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor; and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Pōpū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.
The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the shallow groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site well, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County’s Department of Water. Though no setback was required within the HDF site, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and shallow groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Pop‘ipō region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa- Pop‘ipō-Kalāheo districts), water use in 2035 is projected to be 3,244 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hā‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health Clean Water Branch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted HDF to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling...
within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōlos-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimated potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient concentrations in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.
Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB dairy neighbors and the local Kauai community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawaii Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
This letter is in regard to the proposed dairy at Mahaulepu, Kauai. Let me preface my comments by saying that I am absolutely opposed to ANY development of this pristine area of Kauai.

There are many reasons for my adamant opposition to commercial development of any kind in this area:

**DETRIMENTALLY AFFECT AIR AND WATER QUALITY**
- Waste generated by the large number of cows on the allotted acreage will pollute the ground, water and air, regardless of the waste management plan.

**INVOLES SUBSTANTIAL DEGRADATION OF ENVIRONMENTAL QUALITY**
- Proposed site is close to the ocean and reef; resulting waste run-off will irrevocably damage the environment.
- Soil is not suitable for absorption of waste.

**SUBSTANTIALLY AFFECTS ECONOMIC AND SOCIAL WELFARE OF COMMUNITY**
- Waste will create an adverse environment for both residents and tourists (i.e.: odor, biting flies, air-borne contaminants, etc.); tourists will go where there are no unpleasant environmental issues; residents will lose value on their home investments and want to leave the affected area. Poipu, as a tourist destination, as well as an ideal place to live, will be ruined.

**SUBSTANTIALLY AFFECTS PUBLIC HEALTH**
- The amount of manure will generate thousands of biting flies; this will obviously affect public health and will be a detriment to our health and welfare.
- The damage to our water; both ground water and ocean water, is inevitable and irrevocable; nothing could be worth the loss of our clean water.

Kauai residents do not want the dairy at Mahaulepu. Kauai tourists do not want the dairy at Mahaulepu. We all want Mahaulepu to stay just the way it is: beautiful, clean, undeveloped, loved and appreciated by all. It is a natural resource that must remain as it is so we and our future generations can continue to love and cherish our "aina. It is our kuleana.

In addition, I must add that since HDF has hired Group 70 to do the EIS, and I understand that Group 70 has also done other work for HFD, I find it hard to believe that there is no conflict of interest. It does not seem to be an impartial group that is doing this EIS; therefore, I'd question the legitimacy of the EIS if it is favorable for proceeding with HDF at Mahaulepu.

Sincerely,

Carol Pescaia
May 26, 2016

Carol Pescaia
2224 Waleia Place
Koloa, HI 96756
carol.pescaia@hawaiiantel.net

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhū‘ulepū Road
Kaua‘i, Hawai‘i

Dear Carol Pescaia:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

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DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhū‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture or a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.5, Pasture Management.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.
The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāʻulepū site on Kauaʻi have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs,” mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāʻulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as BST or BGR.

SOILS: Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during dryer periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts of effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawai‘i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.
Soil conservation is a core principle behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices code identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua’i Soil & Water Conservation District in December 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soils Resource Report for Island of Kaua’i, Hawai'i.” The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalahi Clay at 32 percent, Kā‘ena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus, calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas “drainage” refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential for impacts on waterbodies.

In this way, “poorly drained” soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than “well drained” soils (Yost, 2016). As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai’i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbon in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to prolonged pasture-growing season. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai’i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J. The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofer, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua’i, and 8 on O’ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment associated with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua’i.

The HDF project would contribute to diversification of Kaua’i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai’i Island), approximately 10 percent of Hawai’i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua’i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O’ahu.
HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kūloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kūloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the aquifer that underlies Māhāulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kūloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable drinking water quality water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.85 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāulepū 14 well and the County’s Kūloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāulepū Valley, HDF established a 1000-foot setback surrounding the Kūloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no
animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalahā districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwhi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and it is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected...
from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWA, dairy neighbors and the local Kaua‘i community.

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS) existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

**DUST**

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.
Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR
Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaii Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
February 14, 2015

Mr. Jeff Overton
Group 70 International, Inc
925 Bethel Street, Fifth Floor
Honiulu, Hawaii 96813

Re: Hawaii Dairy Farms
Island of Kauai, Koloa District
Tax Map Key: (4) 2-9-003:001 (portion) & 006 (portion: (4)2-9-001:001
Applicant: Hawaii Dairy Farms, LLC

Dear Mr. Overton,

This proposed dairy farm is near a residential, tourist and environmentally sensitive area and should not even be considered for a dairy farm.

I am not a scientist----but the facts and science is very clear that human excrement is less than .75 pounds per day and cow excrement is more than 75 pouncs per day. Eighteen hundred cows is the equivalent of 180,000 humans excreting in the open untreated everyday at the proposed site!! I know for another fact-----the state, county and federal governments would never allow a park, hotel, or private property owner to be allowed to leave untreated sewage in any area---let alone an environmentally sensitive area and close to any residential or tourist area.

The proposed dairy farm is not a "Green" environmentally safe development.

If this dairy is allowed and the negative effects of air quality, water quality and loss of property values, I do intend to pursue monetary damage claims through the legal system.

Sincerely,

Greg Petersen
1654 Kelauika Street
Koloa, Hawaii 96756
Email: petersengreg@msn.com

Greg Petersen
1654 Kelauika Street
Koloa, Hawaii 96756

December 22, 2014

Ms. Jorna Seto
Department of Health
Safe Drinking Water Branch
P.O. Box 3378
Honoiulu, Hawaii 96801-3378

De: Hawaii Dairy Farm Application at Maha'ulepu, Kauai

Dear Ms. Seto,

I am an owner of a home at 1654 Kelauika Street, Koloa, Hawaii and a strong property rights advocate. I am also a strong advocate for responsible property development. The proposed dairy farm at Maha'ulepu on the island of Kauai is an extremely poor location for a dairy farm as it will disrupt tourism which will effect employment, depress property prices------along with the tax base, and cause significant environmental damage to the community, water quality and possible ocean habitat.

It is hard to believe the State of Hawaii and County of Kauai has allowed this to proceed. It has almost no benefit to the county of Kauai and WILL adversely affect the quality of life for everyone on the South Shore of Kauai. The amount of manure generated by these cows would probably be in excess of what 30000-50000 humans excreting daily in the open on that acreage. I'm sure the State and County would not allow that to ever happen!!

I plan to be a part of any legal action and claim if this permit is allowed, against the State of Hawaii, County of Kauai and the applicant, Hawaii Dairy Farms and to seek damages and compensation for loss of property value along with environmental damages.

Thank you for your time and attention to this very important issue. This does impact a significant amount of people who live and visit the island of Kauai!!

Best regards

Greg Petersen

Greg Petersen
The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the

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The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhāulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.
energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for forage, or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawaii is the parenthetical inclusion of the word "nutrients." Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the dairy application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā'ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā'ulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and inflate the beef market in Hawai’i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as HST or rBGH.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasc Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix I.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, modern, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct plus indirect employment associated with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. Ongoing dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.
HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai'i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua'i, and 2 indirect jobs on O'ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua'i and another 8 indirect jobs on O'ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

Hydrology: The area's hydrology is shaped by its geology. The Kūloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths - as great as 400 feet below sea level. Weathered lava in the area is typically Saplulite, a soft, thoroughly decomposed rock. The Māhā'ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kūloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.
animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Poipu region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa-Poipu-Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

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Long-term Operations: Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Hofu‘ula District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected...
which actively disperses inputs within several meters from shore. Comparing nutrient constituents with the committed herd size of 699 mature dairy cows, and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

**DUST**

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.
Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m3, well below the State standard of 150 μg/m3. The estimated concentration for PM2.5 is 0.23 μg/m3, well below the Federal standard of 35 μg/m3 (see Draft EIS Section 4.19 and Table 4-19.2).

Odor

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odor emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawaii Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Rowland Pilaria:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhū‘ulepo Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

Rowland Pilaria
P.O. Box 1235
Koloa, HI 96756
rowliep@aol.com

Subject: Hawai‘i Dairy Farms

Environmental Impact Statement Preparation Notice
Māhū‘ulepo Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001: 001 portion

May 26, 2016
The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāʻulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “ mobs”, mimicking the natural social order of bowies. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

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start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF site. The committed herd size of 699 mature dairy cows at the Mâhâ‘ulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

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PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Mâhâ‘ulepū area, as well as the parasites and predators that control those species. No federal or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stubby fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for Drosophila mukopith, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-‘ōhi‘a forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Mâhâ‘ulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pats in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōloa-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ala Kino‘iki Road between Kōloa and Po‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animal manure wastes within the area. These mitigation measures will make it difficult for flies to breed and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

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The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the

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**Rowland Pilaria**  
May 26, 2016  
Page 4 of 12  

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**Group 70 International**  
925 Bethel Street, 5th Floor  
Honolulu, HI 96813-1391  
Tel: 808.523.5816  
Fax: 808.523.5874  
www.group70int.com  

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**Group 70 International**  
925 Bethel Street, 5th Floor  
Honolulu, HI 96813-1391  
Tel: 808.523.5816  
Fax: 808.523.5874  
www.group70int.com
Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began
collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi
Cave Reserve in April of 2014. The group reported high levels of enterococcus to the
State Department of Health (DOH) and provided its data, however, DOH was unable

Though the waterbody in which the County wells occur is confined and
hydrol ¢¢ᦣóǡ  
established a 1,000- Û 
County Department of Water. Within this setback, no effluent will be applied and no
animals will deposit manure as the area will not be used for grazing. Additional
setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by
HDF into the shallow groundwater within the alluvium to allow monitoring of water
quality. Baseline data on water quality for both groundwater in the alluvium and
groundwater in the deep aquifer were documented. Future monitoring will allow

The HDF site is located on the bottom-¢¢Ǯóǡ 
fed by several intermittent streams coming off of the south slope of the Ha‘upu
Ridge. These normally dry streams converge into man-made channels running
through the HDF site across the valley floor, and meet a concrete ditch that parallels
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the west that originates at a small unnamed reservoir, and continues off site
towards the south.

The State Department of Land and Natural Resources Commission on Water
Resource Management has established surface water hydrologic units for managing
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Water Hydrologic Unit, which features relatively high precipitation with relatively
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SURFACE WATER

Potential Impacts from Construction: The dairy facility and associated infrastructure
will be constructed in a 10-acre area located along the site’s western boundary. Built
facilities within this area will total less than 2 percent of the HDF site. A Stormwater
Pollution Prevention Plan (SWPPP) has been developed as part of the application for
the National Pollutant Discharge Elimination System (NPDES) – Construction
Stormwater General Permit. Management controls will include: minimizing
exposure of disturbed surfaces; monitoring and repair of structural controls; and
prohibiting leaking or poorly-maintained construction equipment and machinery.
Structural controls to be utilized during construction will include: silt fence installed
in key locations; sand bags barriers in swales; and geotextile filter fabric and
sediment logs around drain inlets.

The assessment concludes that the modest potable water demand from the dairy
operation, and the 4,500-     ¢¢ᦣó ͳͶ   
ǯ Û  ǡ      acts to ongoing use of
groundwater in the volcanic aquifer layer, which is the source of potable water.
Groundwater in the alluvium will not impact the County drinking water well.

Potable Water: Once fully operational at the committed herd size of 699 mature
dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million
gallons per day (MGD), of potable (drinking water quality) water from groundwater
provided through an on- Ǥ    ᦣ    
Rules require that potable water be used for milk production, both in the milking
parlor and for milking operations; another potable water use will be for livestock
drinking water. Should HDF decide, in the future, to expand to the contemplated
herd size of up to 2,000 mature dairy cows, potable water demand will increase to
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produced by the on-ǡ  ¢¢ᦣó ͳͶ     
plantation era. All potable water used as wash water will be re-applied to pasture
and thus remain a part of the evapotranspiration cycle. Long-term groundwater
supply impacts are not anticipated to be significant.

The groundwater and surface water analysis for this Draft EIS examined whether
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conducted to determine whether the shallow groundwater in the alluvial material
might discharge into the lower aquifer confined in the unweathered volcanic
material at depth, which is the source of potable water. The results demonstrate
there is no hydrologic connection between the deep aquifer in the unweathered
volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft
EIS provides further detail.

comparison between conditions prior to, and during, HDF operations. Results from
the monitoring program will be shared with the Department of Health Clean Water
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unweathered volcanics by orders of magnitude. Hydraulic conductivity represents
the ability of soils to transport water given a hydraulic gradient, and is expressed in
units of feet per day. It is a measure of how easily water will move within the
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and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of
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Therefore, water movement through soils under the proposed dairy site is 10 times
slower than the neighboring area.

Regional Water Demand:  ǡÛ-Ǯó
and increasing demand for potable water for community and resort development.
The State Department of Economic Development and Tourism (DBEDT) projects the
  ᦣ    -wide by 17,300 residents by 2030. The
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encompass 19.2 percent of the County population. For the South Kaua‘i region (the
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increase of nearly 1 million gallons per day. An evaluation of the island’s
infrastructure capacity for projected growth in population (both residents and
visitors) through the year 2035 predicts the island will be facing a shortage of well
water. Water resources must therefore be carefully managed to accommodate the
projected growth and water demand anticipated in the region through 2035.

Rowland Pilaria
May 26, 2016
Page 7 of 12

Rowland Pilaria
May 26, 2016
Page 6 of 12


a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter times more than nutrient throughput from HDF. Phosphorus for both domestic wastewater and the marine environment. The nearshore area is a highly mixed environment from the milk ing parlors is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and
bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrogen oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-192).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent effluent ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual
offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaii Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
ing tanks for excrement. The waters in front of Gilian house are already some of the most toxic in the state from the 30 or 40 head of cattle grazing in the valley presently. In addition to some wild pigs, and nearby horses stables at CJM. I would think that would be a red flag to those who are not paying attention to the clay rich soil in this flood zone you want to put a large dairy on, and how much worse it will be if 700 and then 2,000 cows are each adding 110 lbs of urine and feces per day.

I am upset that HDF has not been truthful or transparent. Our wells are never on their maps at meetings and this all seems like it was hush hush and no one knew about it for years but the mayor and Grove Farm until last spring. The owners of the Hyatt did not know about it until April!!!

HDF has misrepresented its "experts" such as Dr. Chin Li at UH who never advised you about grass type, or planting. I can't help but wonder who else has been mis-quoted among your experts. Regardless of your mis-information at some of our meetings, all of us who live here know which way the winds blow, and three miles away from the dairy at our home we will smell it if this all comes to pass.

I have a horse, she has 4 acres to roam around it. I can't imagine her sharing pasture with 400 pasture mates even for a few hours and then to think of what the ground would look like in her pasture with that many pasture mates' urine and feces in addition to them surely eating everything in site within hours most likely. It is not rocket scienches that this makes no sense. The "New Zealand model" you keep waving your flag about seems to be a stinker too. From what I have learned, New Zealand has had to close beaches because of the toxic nature of their ocean front dairies, and I have yet to hear any positive reports about them. Friends that have traveled there can attest to the smell and the stinky slime on the beaches near dairies. You have provided no expert advise that the grass plans will regenerate naturally with that many cows eating it each day or have they provided a plan that the 500,000 pounds of daily manure and urine will stay on your leased property even when we have 40 days of constant rain some winters and flash floods that give no time for normal soil to absorb moisture - let alone the clay soil of Mahalapu which absorbs very little. My father lives near us and has his degree in soil science. He is very upset that the clay soil has been all but ignored in the HDF plan. I find it highly suspect this seems to be down played in the consideration of where this dairy is to be considered.

I feel the stakes are too high for one wealthy man gambles at being a "cutting edge" dairy owner. Please have him experiment somewhere away from homes, waterways and the ocean, where he has more land for that many cows. People who save their whole lives to visit somewhere clean and beautiful should not be met with a toxic excrement smell when they get out of their car. People who have worked hard to live here should not have their livelihoods shattered by the smell and pollution of a dairy a few miles away taking away their livelihoods.

People choose Kauai because they want a clean, green, vacation. They don't want to worry about their health when they go to the beach, they want to breath clean fresh air, and not have biting flies to swat at the beach.

Please consider those of us that live here, we don't want to have to move, this is our home.

Mahalo

Shari Pilaria
2551 Ala Kinolani
Koloa, HI 96756
808-652-1864

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May 26, 2016

Shari Pilaria
2551 Ala Kinolani
Koloa, HI 96756

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā'ulepū Road
Kaua'i, Hawai'i

Dear Shari Pilaria:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā'ulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

The following species were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are...
employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

HDF is expected to generate a net income of approximately $60,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $80,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.
WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimāna volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths—a as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black alky clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move through the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Poipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Poipū - Kalahē districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface...
Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, US Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 15-feet from the top of drainage ditches to keep cows away from surface waters. Vegetated buffers will be established between the ditches and drains to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainage ditches; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from the Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Library" (http://health.hawaii.gov/cwb).
To provide perspective, nutrient inputs from the adjacent Kilauea-Pu‘ipu‘u region were also calculated. Nitrogen input to the marine environment in the Po‘ipu region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipu region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EB sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

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at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity/mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEIC website at the following URL, search “Hawaii Dairy Farms”:\http://timeurl.com/3F32EALIAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AIA, LEED AP
Principal Planner

February 21, 2015

To Whom it may concern,

Aloha,

I am a concerned resident of Koloa and have some concerns that need to be addressed and answered regarding the proposed Dairy in Koloa Hawaii. My name is Val Pilaria and my email is: TESellKauai@aol.com. My address is P.O. Box 1235, Koloa, HI 96756.

My concerns and comments are as follows:

(1) Why Koloa and why Mahalupu which is such an important part of our island? I am originally from the mid west and spent several years in California and I know there are better places for a dairy than here. If you wanted it on an island, Why not somewhere on the big island where they won’t be impacting residents close by or Kaholawe?

(2) I am not against Dairy at all and know they are needed but not here. Kauai is small and have you even considered the impact on businesses and hotels here? We were in Hemet California last month and when we returned to our hotel, there was an undeniable stench in the air that was very strong. We had arrived the night before and didn’t notice it and had gone to a meeting and when we returned the next day, there was this foul odor at our beautiful hotel. We asked what it was and the desk clerk apologized and said it was from a 500 cow dairy four miles away! She said it only happens when the winds change which they did that particular day! So here we have the Hyatt hotel and all the condos nearby. People who work at the hotel have mortgages to pay and if this does what many expect to happen, the rooms will no longer be full and the people will be losing their jobs and won’t be able to pay their mortgages. Some employees have been there for twenty
years! Condo owners will have a lower revenue once the word gets out and they will lose their investments. All this for the 15 jobs the Dairy is said to have for locals! Why Kauai??

(3) How are you going to handle the potential contamination to our wells that are near the Dairy and are vital to Kauai?

(4) Rumor has it that the milk is not going to be processed here and will leave the island for other parts and perhaps even China. How are HDF's claims that milk will be cheaper here going to become a reality? I, for one, would prefer to pay the higher prices for milk and protect our Kauai from contamination to our air and our waters.

(5) We have horses and it takes a minimum of one acre per horse on good pasture to sustain a horse. When I hear the numbers of cows per acre you plan to put on grass, it is hard to imagine that many confined to a small pasture without much room to move but there will be plenty of urine and manure there. 60 acres for 2000 cows (we were told this last night at the meeting) for 22 hours a day. If they were using all sixty acres of grass that would amount to .03 acres per cow but if you are rotating as you said you are there will be many more cows per acre. It will exceed the 100 cows per three acre pasture by far and if you didn't rotate and used the whole 60 acres, thirty-three cows per acre is not reasonable. I am looking out on my four acre parcel with my one horse eating the grass and imagining 330 cows out there with her is mind boggling to say the least.

(6) There was a couple from the North part of the island at the meeting last night. They have spent a few years in New Zealand and they can tell you how the Dairy there did not work and it has polluted the waters there. I believe they spoke at an earlier meeting a few weeks ago.

(7) I hope you will listen to the people who live here and care for the aina. Kauai is a special place and we all need to protect it now before it is too late.
Please listen to the people.

I thank you for reading this and would like to be a consulted party.
Val Pilaria
May 26, 2016
Page 2 of 9

Val Pilaria
iselKauai@aol.com

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā`ulepū Road
Kaua‘i, Hawai‘i

Dear Val Pilaria:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory requirements and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā`ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture or a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā`ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to support 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “ mobs”, mimicking the natural social order of hives. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The
management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be maintained or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NCES Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be filled at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāulepū site applies to mature dairy cows.

Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plach Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers, woodworkers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. On-going dairy operations would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full...
production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai'i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property values or property values in the area.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windsrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

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Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles-moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m3, well below the State standard of 150 μg/m3. The estimated concentration for PM2.5 is 0.23 μg/m3, well below the Federal standard of 35 μg/m3 (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of the panelists, in laboratory conditions, cannot smell the odor, but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be
reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agromony/sales science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai’i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.
Hawaiʻi Dairy Farms will create a commercial scale pasture-based dairy operation in Hawaiʻi, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

The planned action will generate new long-term employment in the agricultural sector on Kauaʻi, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawaiʻi Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Pierra A. Plotkins
paplotkins@shaw.ca

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhāulepū Road
Kaua‘i, Hawai‘i

Dear Pierra A. Plotkins:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory requirements are enforced. The State Department of Health is required to determine the ultimate carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. ES sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

The estimated concentration for PM2.5 is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (lines used to map all points having the same numerical...
value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai'i Dairy Farms": [http://tinyurl.com/OEQCIAUAI](http://tinyurl.com/OEQCIAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

James M. Poindexter
1565 Pee Road #112
Koloa, HI 96756

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Mīhā‘ulepū Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear James M. Poindexter:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, masons, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would
be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $60,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.
parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōkō F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōkō F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Ka‘au community.

Regional Water Demand: The adjacent, developed Kōkō-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DREDI) projects the population of Ka‘au will increase county-wide by 17,300 residents by 2030. The South Ka‘au population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Ka‘au region (the Kōkō - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Branch, dairy neighbors and the Library (http://health.hawaii.gov/cwb).

Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.
Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, US Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 659 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūle‘pū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Pō’ipū region were also calculated. Nitrogen input to the marine environment in the Po’ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 14 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po’ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively dispenses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix 1.

Clean Air Act
Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of...
air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai`i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

**DUST**

Dust will be generated as cows move along soft limestone walkways that connect the paddock and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dry manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua`i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670 feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaii Dairy Farms”: http://tceq.state.tx.us/DEP/KCA/1A

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

[Signature]

Jeffrey H. Overton, AIA, LEED AP
Principal Planner
From: Eve Powers <sacredearth@hawaiiantel.net>
Sent: Saturday, February 21, 2015 12:43 PM
To: HDF
Subject: proposed Maha'ulepu Dairy

Our island is very small and the amount of urine & feces produced by your cattle cannot be absorbed and would ruin one of the last undeveloped ahuapua'a on Kaua'i. Please take a longer view with future generations in mind, and do not pollute this pristine area with a dairy in this location. Food sufficiency is one of our island goals, but this dairy will add nothing to that, and is in a very, very wrong location.

Eve Powers
Koloa resident

---

May 26, 2016

Eve Powers
sacredearth@hawaiiantel.net

Subject: Hawai'i Dairy Farms Environmental Impact Statement Preparation Notice

Dear Eve Powers:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai’i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

- The area’s hydrology is shaped by its geology. The Kōloa area was built by Nāpali formation lavas of the Waimea volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite,
Though the water body in which the County wells occur is confined and limited by highly weathered lava at a shallow depth by secondary eruptions of the Koka series, the alluvial material is highly weathered black clay and clayey silt. The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Groundwater Monitoring: Four groundwater monitoring wells were installed by the State Department of Economic Development and 14,865, which when it is completed and operational, will allow monitoring of water quality. Baseline data on water quality for both groundwater and the alluvium and aquifer systems are being documented. Future monitoring will allow determination of the trend of water quality and increasing demand for potable water for community and resort development.

Groundwater in the alluvium will not impact the County drinking water well. The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing these resources. The State Department of Economic Development and Tourism (DBEDT) projects the basin infrastructure capacity for projected growth in population (both residents and visitors) through the year 2025; predictions of the year 2035 may be taken as an indication of the projected growth and water demand anticipated in the region through 2035.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for approval through the NPDES-Construction Program. The SWPPP requires that no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium, Section 4.16.1 of the Draft EIS provides the details.

Pollution Prevention Plan (SWPPP): A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for approval through the NPDES-Construction Program. The SWPPP requires that no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium, Section 4.16.1 of the Draft EIS provides the details.

Surface Water: The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing these resources. The State Department of Economic Development and Tourism (DBEDT) projects the basin infrastructure capacity for projected growth in population (both residents and visitors) through the year 2025; predictions of the year 2035 may be taken as an indication of the projected growth and water demand anticipated in the region through 2035.

The water body in which the County wells occur is confined and limited by highly weathered lava at a shallow depth by secondary eruptions of the Koka series, the alluvial material is highly weathered black clay and clayey silt. The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Groundwater Monitoring: Four groundwater monitoring wells were installed by the State Department of Economic Development and 14,865, which when it is completed and operational, will allow monitoring of water quality. Baseline data on water quality for both groundwater and the alluvium and aquifer systems are being documented. Future monitoring will allow determination of the trend of water quality and increasing demand for potable water for community and resort development.

Groundwater in the alluvium will not impact the County drinking water well. The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing these resources. The State Department of Economic Development and Tourism (DBEDT) projects the basin infrastructure capacity for projected growth in population (both residents and visitors) through the year 2025; predictions of the year 2035 may be taken as an indication of the projected growth and water demand anticipated in the region through 2035.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for approval through the NPDES-Construction Program. The SWPPP requires that no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium, Section 4.16.1 of the Draft EIS provides the details.

Pollution Prevention Plan (SWPPP): A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for approval through the NPDES-Construction Program. The SWPPP requires that no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium, Section 4.16.1 of the Draft EIS provides the details.

Surface Water: The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing these resources. The State Department of Economic Development and Tourism (DBEDT) projects the basin infrastructure capacity for projected growth in population (both residents and visitors) through the year 2025; predictions of the year 2035 may be taken as an indication of the projected growth and water demand anticipated in the region through 2035.
Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageways (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected sediiment logs around drain inlets. one percent of phosphorus (totaling 900 pounds per year) again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 14 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal...
area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline. The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kau‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. ER sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milk cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kau‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.
Results for the committed herd size of 699 mature dairy cows show odors would be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670 feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas, defined by the eight Project Objectives and the four established Evaluation Criteria.

The analysis, therefore, focuses on alternatives that meet the project purpose. Further discussion of the environmental benefits, costs, and risks of each reasonable alternative against those of the proposed project is provided. None of the alternatives would secure a dairy location that meets the purpose and need, and compares environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules, and the Environmental Impact Statement Report (HRS 11-200) requires a discussion of the alternatives that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms would be considered the most viable option as it achieves project objectives and meets each of the four Evaluation Criteria.

Re zoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined during the project's public input. Those options include Agricultural Park, Processing Center, and development of an Agricultural Subdivision. The analysis, therefore, focuses on alternatives that meet the project purpose. Further discussion of the environmental benefits, costs, and risks of each reasonable alternative against those of the proposed project is provided. Of all the alternatives considered, this is the only approach that could potentially exceed those anticipated from the proposed project.

As a part of the DEIS, alternatives were evaluated that could produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not attain the objectives of the action, regardless of cost. There is no requirement for the DEIS to evaluate all reasonable land use alternatives that emerge from public input during the project scoping phase. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements, and the four established Evaluation Criteria.

ALTERNATIVES:

The essential differences as compared to the proposed action are highlighted in the following:

- Only one of the alternative actions (concentrated feedlot alternative) would produce 10 percent of the State’s fresh milk demand, that the reduction in dependency on imported milk (Objective 1). This alternative, however, would not be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670 feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas, defined by the eight Project Objectives and the four established Evaluation Criteria.

- Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fail to comprehensively fulfill the project requirements, and the four established Evaluation Criteria.

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- However, after years of trying, it appears there was limited interest in such a venture. Addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 5) by the two marine development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

- None of the alternatives would secure a dairy location that meets the purpose and need, and compares environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules, and the Environmental Impact Statement Report (HRS 11-200) requires a discussion of the alternatives that could potentially exceed those anticipated from the proposed project.

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- The alternatives analysis provides a comprehensive evaluation of the range of reasonable land use alternatives that emerged from public input during the project scoping phase. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements, and the four established Evaluation Criteria.

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gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

- The planned dairy location meets the requirements of minimum land area, soil properties, site conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

- The planned action will generate new long-term employment in the agricultural sector on Kaua'i including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawaii Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

State of Hawaii – Department of Health
Laura McIntyre, Environmental Planning Office
916 Aia Moana Blvd., Room 121
Honolulu, HI 96814

Re: Hawaii Dairy Farms, LLC Maha‘ulepu, Kauai Project

I wish to provide input now and be deemed a consulted party for future phases of the process regarding the EISN filed in connection with the subject project.

I am a Hawaii resident and homeowner residing about 3 miles from the proposed Maha‘ulepu, Kauai industrial dairy location. If allowed to proceed, the planned dairy would have many extremely negative impacts on the Koloa/Poipu area. The EIS must thoroughly evaluate these adverse impacts, such as those listed below, in full detail.

**ECONOMIC CONSIDERATIONS**

The quality of life for residents and visitors to the area would suffer dramatically. Odors, flies and noise emanating from the dairy would create a situation wherein what is now the major Visitor Destination Area on Kauai would no longer be a desirable place to live in or visit. Occupancy rates at hotels and other rental units would plummet. The decrease in visitor traffic would also negatively impact area businesses like restaurants and shops dependent on tourist trade. This would harm local business owners, and also lead to a rise in unemployment. The value of all real estate in Koloa and Poipu would fall substantially. The resultant decline in assessments would severely impact a major source of Kauai County’s tax revenue. County services would need to be curtailed, or the revenue shortfall would have to made-up by raising rates island-wide, or from the imposition of other taxes.

**WATER SUPPLY ISSUES**

Drinking water for Poipu and Koloa is provided by the County Department of Water from wells located in close proximity to the intended Maha‘ulepu dairy location. In many areas where industrial dairy operations have been introduced water contamination events have occurred. The EIS should fully evaluate the project’s effects on the safety of the drinking water supply as well as the costs to taxpayers of fixing contamination problems.

An industrial dairy farm in close proximity to major visitor and residential communities would have HUGE consequences – an extremely thorough review is clearly in order.

Allan Rachap
1714 Ksonita Pl.
Koloa HI 96756

email: allanjudy@gmail.com
phone: 808-742-1001

cc: Hawaii Dairy Farms, LLC
P.O. Box 1690
Koloa, HI 96758-1690

cc: Group 70 International, Inc.
925 Bethel St. 5th Floor
Honolulu, HI 96813
May 26, 2016

Allan Rachap
1714 Keoniloa Place
Koloa, HI 96756
allanjudy@gmail.com

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Allan Rachap,

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.
WATER QUALITY

Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōlos area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōlos series. The alluvial material is highly weathered lava and is comprised of dark brown to black alhyd day and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move through the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōlos-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōlos F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōlos F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōlos-Poipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,853 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōlos - Poipū - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface
Normal ongoing farming and ranching

Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā’ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā’ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Waipu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā’ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

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Complaints from the public citing the high levels of enterococci in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā’ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part 1. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels measured in ditches running through Māhā’ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffer:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery.

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To provide perspective, nutrient inputs from the adjacent Kīloa-Pōpū region were also calculated. Nitrogen input to the marine environment in the Pōpū region is calculated to be 38,510 pounds annually, or 35 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pōpū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waioli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downstream to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.
Dear Judith Rachap:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

ARCHAEOLOGICAL AND CULTURAL: The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (ABS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the

Sincerely,

Judith Rachap
1714 Keomilina Place
Koloa, HI 96756
judy Rachap@yahoo.com

Subject: Hawai’i Dairy Farms
Environmental Impact Statement Preparation Notice
Mīhā‘ulepū Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

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A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the...
extended survey area. Only one of the sites is believed to be associated with pre-
Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau,
and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of
the project area. The remaining sites consist of historic-era bridges, ditches, culverts,
retaining walls, and a flame system dating from the 20th century and are affiliated
with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not
surprising, given the massive landscape modifications that occurred during intensive
sugarcane cultivation on the valley floor. Even historic era cultural materials
associated with the many Land Commission Awards in the project area were non-
existent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the
archaeological consultant and the dairy project is anticipated to have no impact on
these sites. No further archaeological work is recommended for the sites. Two of the
sixteen sites are considered significant under multiple criteria, but occur outside the
project area on lands owned by a different landowner. Both sites will not be adversely
affected by the proposed dairy project. No site is related to burials, and no bone
were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural
resources, practices or beliefs, its potential to isolate cultural resources, practices or
beliefs from their setting, and the potential of the project to introduce elements
which may alter the setting in which cultural practices take place. Information
received from the community indicates the Māhū'ulepī Ahupua'a, has been and is
currently used for traditional cultural purposes. However, the dairy project area has
not been included in these activities. It is clear that the gathered plants, trails, State
Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved
petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the
leased premises, which will ensure that project activities and any related impacts
are contained within the project area. Based on the research and comments received
from the community, it is reasonable to conclude that, pursuant to Act 50, the
exercise of native Hawaiian rights or any ethnic group related to numerous
traditional cultural practices will not be impacted by establishment of the dairy.

PESTS: A study of invertebrate species and pest insects was conducted by Steven
Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes
the presence or absence of native species or pest species associated with cattle
manure in the general Māhū'ulepī area, as well as the parasites and predators that
control those species. No federally or state listed endangered or threatened
invertebrate species were noted in the survey of the site. A full report and list of
species found on site is provided in EIS Section 4.11 and Appendix E.

Flies were identified on the HDF site using manure from neighboring livestock as
bait for invertebrates. The two flies associated with livestock are the stable fly and
the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are
often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the
HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests
are common in areas with high pet populations. It is possible these fly species could
inadvertently be brought to the dairy and utilize manure as a food source. HDF will
prevent and control fly population growth through diligent clean up and sanitation
practices regarding any trash and food waste, as well as through efficient manure
composting practices. A full list of site management measures is provided in EIS
Section 4.11. The project location does not provide any habitat for drosophila
melanophila, the only Kaua‘i species of native Hawaiian fly listed as Endangered or
Threatened. Native Drosophila habitat is located many miles away in the high
elevation koa-ōhi‘a forests.

Fly populations at HDF will be minimized through a process known as Integrated
Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate
means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of
invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950
to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web
among species.

An especially important insect to minimize fly breeding habitat in manure is the dung
beetle, which buries manure and incorporates it into the soil. Populations of dung
beetles found on Kaua‘i and those species already in Māhū'ulepī Valley, will increase
with the increased manure food source, thus increasing and speeding breakdown of
manure. Dung beetles are specialists in the very important natural process of
breaking up and quickly recycling bovine manure pads. The behavioral diversity
among dung beetle species will work together to bury dung pats in one to three
days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōkō-Po‘ipū region, pest fly populations are dependent upon food and
breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in
the region on agricultural lands along ʻAla Kinoiki Road between Kōkō and Po‘ipū, and it
is likely the livestock-related flies identified at the HDF site occur in this region as
well. Localized controls to reduce pest populations need to address breeding sites in
and amongst the food and animal wastes within the area. These mitigation
measures will make it difficult for flies to breed, and BMPs will be enforced to
address any increase in population, therefore it is expected that the dairy farm will
not significantly affect recreational and resort areas.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms
(HDF) to the existing economy were evaluated in the Draft Environmental Impact
Statement (EIS), including a fiscal impact assessment report completed in April,
2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic
and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local
construction personnel and local material suppliers. Such jobs would include
equipment operators, cement workers to lay foundations, metal workers,
carrpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, direct employment related to Dairy construction would be expected to average about 16 jobs on Kaua'i, and 8 on O'ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua'i.

The HDF project would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai'i Island), approximately 10 percent of Hawai'i's milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua'i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O'ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai'i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua'i, and 2 indirect jobs on O'ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua'i and another 8 indirect jobs on O'ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY:

Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area's hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali will increase the supply of local fluid milk by approximately 1.2 million gallons of milk per day. The groundwater and surface water analysis for this Draft EIS examined whether the quality of groundwater and surface water was documented.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketting the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā'ulepū Valley and the HDF site ranges from 105 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kūloa–Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two water bodies within Māhā'ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai'i Department of Health Milk
Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāulepi 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāulepi 14 well and the County’s Kōka F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāulepi Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 3,24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surf ace Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāulepi Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāulepi watershed.

The HDF site is located on the bottom-land of the upper Māhāulepi Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāulepi Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

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HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35 feet from the top of drainageway (totaling 70 feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 659 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kāloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient through put from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopilī Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively dispenses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a wind rose depicting wind speed and direction in the area (see DEIS Section 4.11, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act
Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for...
Six criteria pollutants. The State of Hawai‘i has established its own Air Quality Standards (NAAQS) to protect public health and welfare, including guidelines for ambient air quality. Odor, or air pollution that is perceptible to the human sense of smell, is specifically addressed by the State standard for the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the population can smell it.

State standards prohibit any visible emissions of fugitive dust from construction activities at the property line. Dust is generated as cows move over dirt and dried manure throughout the day, and dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlors. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals reside. Results for the committed herd size of 699 mature dairy cows show that odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” (U) that are a fraction of the concentration of compounds capable of producing odors, with detection limited to 50 percent of the sensitive population.

Applying the emission rates from this available literature greatly overestimates the potential emission resulting from HDF. Cows in the rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions. Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on site. As at the lower threshold of 699 cows, the potential fugitive dust emissions were well below the State standard of 150 μg/m³. The estimated concentration for PM 2.5 is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

The EIS describes the steps used to develop an air quality model to predict air quality impacts from the HDF dairy. The air quality model used was AERMOD, which allows for the incorporation of meteorological data, irrigation location, and grazing location. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual on-site odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

Thank you for your participation in the environmental review process. We hope this information has been helpful in your consideration of HDF's potential impact on air quality. If you have any questions, please do not hesitate to contact us.

Sincerely,

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
GROUP 70 INTERNATIONAL, INC.
Questions Regarding Environmental Impact Statement
Maha‘ulepu Dairy
Bob Ray, February 2015, bobrayiii@hotmail.com

I have attended several Koloa Community meetings on the proposed dairy.

Here are my questions for writers of the Environmental Impact Statement for this project.

First: acidification. Waterborne wastes from streams may flow into the ocean where reefs might absorb some nutrients and open ocean dilute the rest. But problems such as acidification might persist. An example of this acidification could result in Australia's Great Barrier Reef dissolving into a wider and deeper Coral Sea.

What procedures will the dairy operators take to mitigate acidification of local water?

Second: baseline figures on various coliforms offshore. A member of the Kaua‘i Surf Association told the Koloa Community center audience about results of water sampling in the shorebreaks of beaches around the island. Samples near the Gillin house on Maha‘ulepu beach showed the highest levels of animal and human waste on the island of Kaua‘i.

What are the results of dye flushed down the toilets of the Gillin house to see if coliforms stay in the drain field or shows up offshore?

Third: Grassed waterways and terraces. Grassed waterways and terraces have been shown to control pollution several ways. They can stop erosion, and keep runoff away from beaches, away from swimming areas, away from reefs, away from open oceans. And grassed waterways can keep percolation from polluting well water.

What are the percolation characteristics now, and what procedures will the operator undertake to maintain the slope and the percolation characteristics of the topsoil?

Fourth: backup operators. The operator has to work at best practices every day. If he quits or goes on vacation, someone has to do the job or inspectors will write you up and neighbors will complain that you are not really serious about controlling pollution.

What insurance policy, performance bond, or backup staff will the dairy use to ensure continued best-practices operation?

Fifth: Litigation. Can Poipu neighbors sue Grove Farm as owners of a polluting nuisance? And win? Can critics avoid court by writing contract procedures to operate pollution control systems according to best practices?

Sixth: Engineering Solutions and Performance Bond. Engineers treat pollution control like puzzles. They solve puzzles by building primary sewage treatment plants. If that leaves some unsolved puzzles, they add a secondary treatment plant. For remaining puzzles, for either municipal or industrial wastes, engineers add a tertiary treatment plant. Taxpayers and stockholders don't like the expense.

Money in the bank for one polluter can be many multiples more than another polluter, but their pollution solutions can break the bank for either one of them.

Will the dairy post a bond to insure that the acreage will be returned to its 2014 slope and grass cover if the dairy goes broke?

Seventh: dairy dependence on grass for total digestible nutrients. Lapperts can say “we started with milk.” Some dairymen say, “I start by testing cows and looking at bull pedigrees.” Parker Ranch cowmen say, “We manage grass.” Howie Buffett, in his book “40 Chances” says, “I manage dirt.”

Maha‘ulepu Dairy is reported to say Kikuyu grass and Guinea grass are the foundation of its business plan. Guinea grass grows all over Kaua‘i and is managed as a weed. What are the total digestible nutrient characteristics of Guinea grass? Do cattle eat enough of it to make milk?

In Kenya, native Kikuyu grass grows in deep soil in temperatures ranging from the 40s to the 90s. In Kokee, Kikuyu is invasive and grows in damp soil in temperatures between the 30s and 80s. At the Santa Rita Experiment Station, outside of Tucson, Kikuyu has grown over 50 years in parched soil at temps between freezing and 100. The dairy expects the same success claimed by New Zealand dairies which plant Kikuyu. The question isn’t “Do these soil and temperature ranges make the dairy impossible in Maha‘ulepu?”

The questions are, “Can Kikuyu grass thrive in shallow soil at temperatures between 65 and 85 in Maha‘ulepu? And can cows thrive on it and produce enough milk to make money? And does it taste good to cows? Does it make good hay with the right balance of total digestible nutrients? Does it improve soil? Can the dairy manage the dirt? Can the dairy cope with rain delays in spreading liquid waste? And cope with windborne odor as well as the sewage treatment plant 50 yard west of the Hyatt spa?”

Kikuyu extends runners along the ground, which is good for erosion control.
This growing aspect nourishes grass roots and may improve soil tilth.

What are the results in tonnage of harvest, palatability of hay, and pounds of milk? Can Guinea grass supply nutrients Kikuyu grass lacks?

A golf course greenskeeper or a farmer can control odors and storm runoff if he can use things like carbon dioxide, nitrates, and phosphates as soil nutrients.

Farming practices can sequester carbon dioxide in soil and growing plants. Nitrates and phosphates bind to soil particles and will stay out of ground water and out of runoff when farmers terrace the slopes and when they maintain grassed waterways – or fairways.

Compounds such as CO2, CH4, NH4, and P2O5 are called “nutrients” because these chemicals make algae bloom or make coral die if you let them into water. They’re nutrients for any organism containing chlorophyll. Recently, researchers have added CO2 onto the list of other things that we don’t want to get into the water where it acts like a nutrient and upsets the pH balance between acid and alkali.

The Maha‘ulepu Dairy has a building permit to terrace the land, and fence the streams to keep cows out of the floodplain, and fence the pastures for rotation to give the grass a chance to recover from heavy grazing. Next, they need an operating permit.

Can inspectors can revoke the operating permit if the operators don’t follow procedures?

Eighth: Odor Control. Can the dairy control odors as well as the sewage treatment plant situated 50 yards west of the spa at the Hyatt Resort and Spa?
management practices and pasture design are key to achieving the desired goal. The HDF system is designed to utilize 100 percent of the cows' manure on-site. However, nutrients would be introduced to the site through the use of commercial fertilizers, organic by-products, waste water, and slurry. The irrigation system is designed to provide the necessary water for the pasture, while the effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows. The effluent will be applied to the pasture every four days, and the slurry application is expected to provide a benefit.

The timing and application of nutrients will correspond with plant uptake, soil management, and crop growth. The effluent is applied to the pasture in a narrow, linear pattern, with water used for irrigation purposes. The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows. The effluent application is expected to provide a benefit.

The pasture-based model allows cows to move about freely, and to lie down and rest. The cows are rotated through the paddocks, providing fresh grass and a comfortable path. The pasture-based model results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet. Improvements in grass productivity are anticipated to provide up to 85 percent of the cows' diet. The pasture-based model results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet. Improvements in grass productivity are anticipated to provide up to 85 percent of the cows' diet.
Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and increase the beef market in Hawaii with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven't given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

**WATER QUALITY**: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawaii’s Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology**: The area’s hydrology is shaped by its geology. The Kōkoa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhūalēpū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōkoa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhūalēpū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōkoa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhūalēpū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water**: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD) of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaii’s Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhūalēpū well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhūalēpū 14 well and the County’s Kōkoa F well will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhūalēpū Valley, HDF established a 1,000-foot setback surrounding the Kōkoa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring**: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.
Regional Water Demand: The adjacent, developed Kōloa-Po‘ipu region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipu - Kalāheo districts), water use in 2035 is projected to be 3,242 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawahi Cove Reserve in April of 2014. The group reported high levels of enterococci to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococci in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Library" (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainagesways to create filter strips that could capture particulate and nutrients during stormwater events. Another setback restricts application of effluent within 50 feet of the drainagesways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in deficit and require commercial supplementation. Grass yields are anticipated to...
Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line. Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day. Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions. Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the
background concentration of particulate matter (both PM$_{10}$ and PM$_{2.5}$) measured on the island of Kaua‘i), and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM$_{10}$ is 2.01 μg/m$^3$, well below the State standard of 150 μg/m$^3$. The estimated concentration for PM$_{2.5}$ is 0.23 μg/m$^3$, well below the Federal standard of 35 μg/m$^3$ (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670 feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawai‘i Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Gerald and Hannah Rees
1941 Poipu Road
Koloa, HI 96756

Dear Gerald and Hannah Rees:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

ARCHAEOLOGICAL AND CULTURAL: The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPFD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the...
extended survey area. Only one of the sites is believed to be associated with pre-
Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau,
and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of
the project area. The remaining sites consist of historic-era bridges, ditches, culverts,
retaining walls, and a flame system dating from the 20th century and are affiliated
with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not
surprising, given the massive landscape modifications that occurred during intensive
sugarcane cultivation on the valley floor. Even historic era cultural materials
associated with the many Land Commission Awards in the project area were non-
existent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the
archaeological consultant and the dairy project is anticipated to have no impact on
these sites. No further archaeological work is recommended for the sites. Two of the
sixteen sites are considered significant under multiple criteria, but occur outside the
project area on lands owned by a different landowner. Both sites will not be adversely
affected by the proposed dairy project. No site is related to burials, and no bones
were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural
resources, practices or beliefs, its potential to isolate cultural resources, practices or
beliefs from their setting, and the potential of the project to introduce elements
which may alter the setting in which cultural practices take place. Information
received from the community indicates the Māhūʻulepū Alupapa, has been and is
currently used for traditional cultural purposes. However, the dairy project area has
not been included in these activities. It is clear that the gathered plants, trails, State
Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved
petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the
leased premises, which will ensure that project activities and any related impacts
are contained within the project area. Based on the research and comments received
from the community, it is reasonable to conclude that, pursuant to Act 50, the
exercise of native Hawaiian rights or any ethnic group related to numerous
traditional cultural practices will not be impacted by establishment of the dairy.

WATER QUALITY: Technical consultants conducted field studies and analysis on
groundwater and surface water resources in the area, and evaluated potential
impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions
and probable impacts are presented in the Draft Environmental Impact Statement
(EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E
and F. The location and connectivity of groundwater bodies were determined, and the
quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built
by Napali formation lavas of the Waiomä volcanic series. Surface lavas of the Napali
formation exhibit extensive weathering which may extend to considerable depths –
as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite,
a soft, thoroughly decomposed rock. The Māhūʻulepū Valley floor is filled with
alluvium, which generally extends about 60 feet under the surface and is underlain
by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa
series. The alluvial material is highly weathered lava and is comprised of dark
brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified
two groundwater bodies within the valley: (1) groundwater located in a deep
aquifer system within unweathered volcanic material, which is buried beneath thick
alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The
aquifer of highest value and use resides deep within the unweathered volcanic
material. The alluvial material blanketing the valley floor is less permeable than the
unweathered volcanics by orders of magnitude. Hydraulic conductivity represents
the ability of soils to transport water given a hydraulic gradient, and is expressed in
units of feet per day. It is a measure of how easily water will move within the
ground. The hydraulic conductivity of the alluvium that underlies Māhūʻulepū Valley
and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of
soils in the adjacent Kūloa-Poipū region is on the order of 201 – 500 feet per day.
Therefore, water movement through soils under the proposed dairy site is 10 times
slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether
the two waterbodies within Māhūʻulepū may be connected. Four studies were
conducted to determine whether the shallow groundwater in the alluvial material
might discharge into the lower aquifer confined in the unweathered volcanic
material at depth, which is the source of potable water. The results demonstrate
there is no hydrologic connection between the deep aquifer in the unweathered
volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft
EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature
dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million
gallons per day (MGD), of potable (drinking water quality) water from groundwater
provided through an on-site well. The State of Hawai’i Department of Health Milk
Rules require that potable water be used for milk production, both in the milking
parlor and for milking operations; another potable water use will be for livestock
drinking water. Should HDF decide, in the future, to expand to the contemplated
herd size of up to 2,000 mature dairy cows, potable water demand will increase to
84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD
produced by the on-site, existing Māhūʻulepū 14 well during the sugarcane
plantation era. All potable water used as wash water will be re-applied to pasture
and thus remain a part of the evapotranspiration cycle. Long-term groundwater
supply impacts are not anticipated to be significant.
The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalāheo districts), use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: sift fence installed in key locations; sand bags barriers in swales; and geotextile fiber fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Library" (http://health.hawaii.gov/cwb/).

**Long-term Operations: Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top
of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po'ipu region were also calculated. Nitrogen input to the marine environment in the Po'ipu region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of 10,000 pounds per year, and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odor and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict as or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure...
application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST
Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM2.5 is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR
Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawai'i Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Riley, Mark and Simpson, Ann:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai’i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai’i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, foremen, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would
be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment associated with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawaii Island), approximately 10 percent of Hawaii’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawaii.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

_**WATER QUALITY:**_ Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawaii Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23, the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

*Hydrology:* The area’s hydrology is shaped by its geology. The Kōloa area was built by Nāpali formation lavas of the Waimea volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10⁻⁵ – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipu region is on the order of 20¹ – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

*Potable Water:* Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaii’s Department of Health Milk Rules require that potable water be used for milk production, both in the milking
The HDF site is located on the bottom-end of the Upper Mālipapa Valley, which is part of the Pauoa-Waiʻohe sub-basin. This sub-basin is a significant source of water for the islands and serves as the main water source for the Upper Pali-Oahu Water District. The site is approximately 3 acres and is surrounded by agricultural land. HDF operations are scheduled to begin in 2018 and will be managed by a private company. HDF operations will include the installation of 12 wells, each capable of producing 2,000 gallons per day (gpd), and the construction of a treatment plant that will be capable of processing up to 2.5 million gallons per day (MGD). The treatment plant will include processes such as flocculation, sedimentation, and disinfection, and will be designed to meet the Hawaii State Department of Health's (HSDOH) drinking water standards. The project will be constructed in phases, with the first phase expected to be completed in 2020. The expected cost of the project is $30 million, with funding provided by a combination of state and federal grants, as well as private capital. The project will provide much-needed water resources for the area, particularly during dry periods, and will help to reduce the risk of drought-related issues. The project is expected to create 100 jobs during construction and 50 jobs during operation. In addition, the project will have a positive impact on the local economy and will help to support the livelihoods of local residents.
Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, US Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlors is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 659 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūle‘pū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and crosses the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Pōpūi region were also calculated. Nitrogen input to the marine environment in the Pōpūi region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pōpūi region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipōlī Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Sections 4.19, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act
Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from effluent ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity/mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Odor emissions sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4.19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Results for the contemplated herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawaii Dairy Farms”: http://tinyurl.com/OEQC8AUA

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Mike and Laurie Rose
P.O. Box 325
Clayton, CA 94517
lrose1980@gmail.com

Subject: Hawai'i Dairy Farms

Environmental Impact Statement Preparation Notice
Māheʻulepū Road
Kauaʻi, Hawaiʻi
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Mike and Laurie Rose:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

Your comments were received by the State of Hawai'i Department of Health Environmental Planning Office. The Department of Health forwarded a copy of your comments to Group 70 International in order to be included in the Draft Environmental Impact Statement (EIS) analysis. This letter was prepared in response to your comments.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

SOILS:

Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during dryer periods, to filter and buffer potential pollutants from leaching fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling...
were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawai‘i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soils Resource Report for Island of Kaua‘i, Hawai‘i.” The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalihi Clay at 32 percent, Kalena Clay Brown variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas “drainage” refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential for impacts on waterbodies. In this way, “poorly drained” soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than “well drained” soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai‘i’s soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbon in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing season. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

DEMOGRAPHIC AND ECONOMIC The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix I.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally sourced.
supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thougshly decomposed rock. The Māhūʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary enrichments of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick weathered volcanic material. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhūʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poʻipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhūʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhūʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhūʻulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of...
groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāulepū Valley, HDF established a 1,000-foot setback surrounding the Kīloa Fowell in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōka-Po‘ipi‘ region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōka - Po‘ipi‘ - Kalīhea districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment log around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kalā‘a, Part 1. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāulepū Valley. The group reported entering the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed through the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the National Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to...
create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 4,999 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhōʻeplepi will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kūla-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 35 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

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The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient concentrations in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

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Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.
DUST
Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5), measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m3, well below the State standard of 150 μg/m3. The estimated concentration for PM2.5 is 0.23 μg/m3, well below the Federal standard of 35 μg/m3 (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR
Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual off-site odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaii Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Sir,

I am writing to you because of several concerns that I have that need to be addressed and answered in the EIS for the Hawaii Dairy Farms proposal. I am concerned that the presence of so many cows will negatively impact the ground and surface water of Mahalepu and on occasion the animal waste will reach the ocean. Because of the smell and potential for introduction of large numbers of flies, it may impact beneficial use of the environment for a large distance from the dairy and the introduction of a new species of wasps, not already existing on Kauai, to curtail the fly population could further impact the beneficial use of the environment.

I am also concerned that the organization that will conduct the EIS is not an objective third party but will gain substantially if the dairy is allowed to go forward. This is makes it very hard for them to perform an objective study.

Thank you very much.

Gail C. Rosen

February 23, 2015
Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD). Dairy Farms EIS with the level of analysis required to properly evaluate and disclose provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated potential cumulative and secondary effects.

The groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Wai‘anae volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprrolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer within unweathered volcanic material, which is buried by about two feet of thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 18.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies in Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

SURFACE WATER

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2030, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalalaheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.
The State Department of Land and Natural Resources Commission on Water Sanitary Survey can be accessed on the DOH Clean Water Branch website under Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is led by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Waipio Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data; however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waipio Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The debris canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people.

Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Library" (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainage ditches (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that can capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainage ditches; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8
inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōlōa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipōlī Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10-20 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kauaʻi community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. ER sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄), from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day. Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.⁵) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.91 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.⁵ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.
Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawaii Dairy Farms": http://hiawh.com/0EQCkAUI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Hi Laura,

Did you receive this UIPA request from HDF? The WWB only received a couple of letters and emails in response to the comments for HDF's Environmental Impact Statement Preparation Notice. Can we provide you with our copies of these letters and emails to include in your request?

Thanks,
Sina

-----Original Message-----
From: Nishioka, Miles
Sent: Monday, February 23, 2015 9:21 AM
To: Pruder, Sina L
Cc: Tomomitsu, Mark S
Subject: FW: UIPA REQUEST HDF

Forwarding what Carroll Cox sent in an email.

Miles Nishioka
State of Hawaii, Dept of Health
Wastewater Branch
919 Ala Moana Blvd Rm 309
Honolulu Hi 96814
ph: 586.4294
e-mail: miles.nishioka@doh.hawaii.gov

-----Original Message-----
From: Carroll Cox [mailto:photos@estudioshawaii.com]
Sent: Monday, February 23, 2015 9:21 AM
To: Nishioka, Miles, CARRoL@CARROLLCOX.COM
Subject: UIPA REQUEST HDF

Dear Mr. Pruder,

We hope with this letter to communicate our extreme concern about the proposed dairy farming activity near Maha'ulepu in Kauai County. Our concerns relate to likely environmental, aesthetic and economic impacts.

Environmental and aesthetic

1) It seems that bacterial counts in the ocean off Maha'ulepu beach, reflective of organic waste runoff, are already persistent at 10 times the upper limits of what are deemed acceptable. This is already the case before the daily contributions of 100's of pounds of cow manure to the lands that feed into that runoff. The current conditions seem to call for efforts to improve rather than aggravate the water quality in an area that supports both recreational activity and a major coral reef already stressed by seawater temperature and acidity changes.

2) The presence of manure and a herd of cows is likely to support sharp increases in the numbers of biting flies and mosquitoes into an area that is substantially free of these pests under present conditions.

3) When the wind is unfavorable we are concerned that odors from the dairy enterprise will be bad enough to render the nearby homes and resort areas substantially unpleasant.

Economic

We understand that adjacent Poipu resort activities currently generate about 25% of Kauai's tourist revenue. If the adverse environmental and aesthetic consequences of the dairy farm play out as described above, the area would become much less attractive or valuable as a resort destination. We would be inclined to sell our condominium, even below our original purchase price. If other property owners felt the same there would be a decline in the tax base that would need to be absorbed by the rest of the Island – including year round residents. Not to mention the overall decrease in tourist revenue generated by a less attractive destination.

While we understand the rights associated with development of properties by their owners, we think there should be limits to how much environmental harm these activities can be allowed and how much economic harm they can do the economy of the island as a whole.

New Zealand and Washington State, both environmentally sensitive communities, have been dealing with the consequences of this form of dairy enterprise including huge pollution problems. The communities are working to dismantle these operations and mitigate their harmful effects with programs that require the investment of lots of time, effort and money. It would be a shame to repeat and compound those past, well-intentioned mistakes in Hawaii.

Sincerely,

Henry Rosen, Esq.
May 26, 2016

Henry and Sara Rosen
15 Puipu Sands, 1565 Pe'e Road
Koloa, HI 96756

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā'ulepū Road
Kaua'i, Hawai'i

Dear Henry and Sara Rosen:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven results at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. The permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā'ulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in ES Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua'i but not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these flies could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila, the only Kaua'i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-ʻōhi'a forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially IPM disrupts reproduction with appropriate means at key points in the pest's life cycle. Used in Hawai'i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua'i and those species already in Māhā'ulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pats in one to three days, a shorter amount of time than the 10–30 days flies eggs need to hatch.

In the Kōla-Pu'uli region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Alaka'i Road between Kōla and Pu'uli, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized control to reduce pest populations need to address breeding sites in and amongst the food and animal waste within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai'i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State
employment multipliers, indirect employment related to Dairy construction would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the tourist industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 12 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $560,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY:

Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Nāpali formation lavas of the Waimāna volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths — as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered lavas by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley and the HDF site ranges from 10.5 – 500 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking
parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane production era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōkō F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōkō F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōkō-Po‘ipu region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōkō - Po‘ipu - Kalahā districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor; and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CBW to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watermolds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CBW noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).
Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35 feet from the top of drainageway (totaling 70 feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 659 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūle‘pū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,280 pounds annually, or 14 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downstream from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipōli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 1.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of...
air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylot" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent collection system, and published rates for manure odors emissions for dairy heifers and effluent ponds were added to the potential emissions from HDF.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1.670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual odors may be less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the DEQ website at the following URL, search “Hawaii Dairy Farms”: http://nirequel.mn/DEQCAHAP

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
2) The presence of manure and a herd of cows is likely to support sharp increases in the numbers of biting flies and mosquitoes into an area that is substantially free of these pests under present conditions.

3) When the wind is unfavorable we are concerned that odors from the dairy enterprise will be bad enough to render the nearby homes and resort areas substantially unpleasant.

Economic:
We understand that adjacent Poipu resort activities currently generate about 25% of Kauai's tourist revenue. If the adverse environmental and aesthetic consequences of the dairy farm play out as described above, the area would become much less attractive or valuable as a resort destination. We would be inclined to sell our condominium, even below our original purchase price. If other property owners felt the same there would be a decline in the tax base that would need to be absorbed by the rest of the Island - including year round residents. Not to mention the overall decrease in tourist revenue generated by a less attractive destination.

While we understand the rights associated with development of properties by their owners, we think there should be limits to how much environmental harm these activities can be allowed and how much economic harm they can do the economy of the island as a whole.

We are also concerned that the management of HDF have been less than forthright in their communications with DOH and with the general public. HDF appears to have omitted from their EIS Application, key findings from the USDA regarding surface water runoff and soil drainage, namely:

HDF's Plan, however, directly contradicts the findings of the NRCS (a federal agency, the Natural Resource Conservation Service (NRCS), a division of the US Department of Agriculture, that completed a custom conservation study June 5, 2014 for the exact site HDF proposes to operate on). The NRCS, "Custom Soil Resource Report", determined that most of the soil on the Maha’ulepu farm is "very limited" in its ability to absorb animal waste. The NRCS Report further described the majority of the soil as "high" or "very high" risk for run off due to the clay based nature of more than 80% of the farm soil.

HDF did not disclose the NRCS report or its adverse findings of June 5, 2014, when they filed their Plan with DOH on July 23rd, 2014. Instead, HDF claimed, in their Application, that the farm’s soils were well suit for an animal waste operation.

Ironically the best soil drainage on the site appears to be near two county wells that serve Koloa and Poipu.

We believe that many features of this project require especially careful scrutiny - with the overall welfare of the broad county and state foremost.

Sincerely,

Sara and Henry Rosen
May 26, 2016

Sara and Henry Rosen
15 Poipu Sands, 1565 Pe'e Road
Koloa, HI 96756

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhū'ulepū Road
Kaua'i, Hawai'i
TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Sara and Henry Rosen:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. The Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP. This term was used to identify HDF’s intent to utilize a locally-produced feed stock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhū'ulepū site on Kaua'i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “herds”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the
energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Small paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for Hawai'i is the parenthetical inclusion of the word "nutrients." Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāʻulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

SOILS: Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during dryer periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawai‘i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a "Custom Soils Resource Report for Island of Kaua‘i, Hawai‘i." The report was generated from the USDA NRCS website, which allows any internet user
to define an area of interest, customize data results, and generate a Custom Resource Report. The user can select or deselect parameters based upon which data are likely greatest in highly degraded soils in warm subtropical climates, partly due to the user would like to display. These user-generated reports are not evaluated by NRCS.

Improvement to the physical, chemical, and biological condition of the soil. The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and the presence or absence of native species or pest species associated with cattle grazing and manure. Soil testing for sodicity, soil salinity and exchangeable sodium percentage, in addition to nutrient levels of composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for endangered or threatened species found on site.

Soil salinity and sodicity are important factors in soil health. Soil types at the HDF site are likely to have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrate and nitrite to gases, which reduces the potential for impacts on waterbodies. In this way, "poorly drained" soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than "well drained" soils (Yost, 2016).

As a result of reduced movement of water through the soil, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are likely to have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrate and nitrite to gases, which reduces the potential for impacts on waterbodies. In this way, "poorly drained" soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than "well drained" soils (Yost, 2016).

As an especially important insect to minimize fly breeding habitat in manure is the dung beetle. These beetles are common in areas with high pet populations. It is possible that fly species could become a problem at the HDF site with the increased manure as a food source. This is an important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work to bury dung pads in one to three days. Breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural land along Alaska School. The dairy's focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grasslands is an effective way to recapture carbon from the atmosphere.
The dairy is expected to generate a net additional contribution to the County of approximately $8,000, for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area's hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths - as great as 400 feet below sea level. Weathered lave in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor; and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.
The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai’i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evaporative cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF installed a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa- Po‘ipū-Kalalaua districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hāupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands. Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling...
within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline. The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surfacemarine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The offshore testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring...
program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. ER sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

**DUST**

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 6-192).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
19 February 2015

To whom it may concern:

In response to the Environmental Impact Statement Preparation Notice (EISPN) submitted by Hawaii Dairy Farms, LLC (dated January 2015), I would like to express my significant concerns about the potential impacts of the proposed dairy operation on local water resources, particularly impacts to water quality. As a water resource engineer and hydrologist involved in land and water resource management on Kauai for the past 12 years, I have seen firsthand the degradation of water quality due to cattle grazing and associated land use practices. While I generally agree with the concept of expanding agriculture on the island of Kauai to lessen the island’s reliance on imported food, I strongly feel that any proposed new agricultural operations need to be carefully evaluated with regards to site location and potential environmental impacts. I commend Hawaii Dairy Farms, LLC for beginning the process of thorough evaluation through an Environmental Impact Statement (EIS), and I request that the following questions and comments be addressed through the study.

1. What is the expected water quality of runoff from the paddocks (where manure and waste liquids will be applied), given the presence of poorly-drained soils and the frequency of high-intensity rainfall events in the area? Surface runoff from the open fields is inevitable and can be difficult to contain and/or treat for non-point source pollutants. The EISPN indicates that Groundwater Hydrology and Water Quality Technical Studies will be performed as part of the EIS process. The effects of proposed Best Management Practices (BMPs) on non-point source pollutant loading to local waterways should be quantified using the best available science, and appropriate mitigation measures should be identified.

2. How will compaction of soils by grazing cattle be accounted for in the hydrologic modeling and/or analysis in the Groundwater Hydrology Technical Study? Soils in the proposed project area are predominantly fine-grained (i.e. clay) with poor drainage qualities, and soil compaction due to cattle grazing can and probably will significantly reduce the soils ability to infiltrate rainwater resulting in more frequent surface runoff and higher runoff volumes than under current conditions. Runoff retention/detention strategies should be considered for pasture lands.

3. How will pollutant migration from proposed dairy operations to groundwater be analyzed and/or modeled? What impacts (if any) to groundwater quality are expected due to the proposed dairy? Given the presence of limestone and known Karst features like the Makauwahi cave/sinkhole in the watershed, how will pollutant fate & transport be evaluated for the aquifer underlying the proposed dairy? Portions of the proposed project area are known to have a relatively shallow water table; can vadose zone/groundwater models be used to show that pollutants such as fecal bacteria and nutrients (e.g. N, P, K) will not migrate through the soil column into local groundwater?

4. How will climate change impacts on local hydrology be addressed in the analysis? We know that future rainfall regime cannot be cleanly predicted from past records, so rainfall parameters used for modeling and/or computations should be based on future rainfall projections that account for increased frequency of high-intensity rainfall events that can produce substantial surface runoff in the proposed project area.

5. What models will be used to simulate rainfall-runoff response and associated non-point source pollutant transport? We know that most hydrologic models have been developed for very different environmental conditions than those found in Hawaii, and many model predictions generally do not track well with observed data. A factor of safety should be used to account for this.

6. Assuming buffer strips will be used between grazed lands and any surface waters present in the proposed dairy area, what model(s) will be used to determine suitable buffer strip width? What other BMPs being proposed can be incorporated into hydrologic modeling to determine their effectiveness in reducing non-point source pollution from the proposed dairy farm? Again, given the significant uncertainty regarding the effectiveness of pollutant load reduction from various agricultural BMPs in the tropical island environment, it is suggested that a factor of safety approach be used in the analysis to site and size BMPs.

It is my hope that through the EIS process, all potential adverse impacts to the sensitive environment surrounding the proposed dairy farm will be thoroughly evaluated, resulting in a plan that will balance the dairy’s operational goals and objectives with the need to protect water quality in the area’s waterways and the nearshore marine environment. I recognize that if the proposed project is done right, it can provide significant benefits to the Kauai community, but this cannot be at the expense of local water quality or other significant environmental degradation.

Please give the comments and questions included here the proper consideration as the EIS process moves forward. If any clarification of these comments and/or questions is needed, do not hesitate to contact me at (808) 639-2640 or laminarmatt@gmail.com.

Sincerely,

Matt Rosener, P.E.
Water Resource Engineer/Hydrologist
North Shore Hydro
May 26, 2016

Matt Rosener
laminarmatt@gmail.com

Subject: Hawai’i Dairy Farms

Environmental Impact Statement Preparation Notice
Mahahu’ulep Road
Kaua’i, Hawai’i

TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Matt Rosener:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai’i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

CLIMATE: Draft Environmental Impact Statement (EIS) Section 4.1 addresses climate conditions. Climatic conditions affect the growth of forage and the health of dairy cows. Heat stress can reduce the productivity of dairy cows, and suitable climatic conditions were an important consideration in siting the dairy.

The Po'ipu area is generally known for its mild conditions. The area’s climate is greatly influenced by its inland location and valley topography. Winds in the Po'ipu area are generally from the east-northeast direction (tradeswinds) ranging from 5 to 15 miles per hour. Wind conditions vary depending on season and weather conditions, as occasional storms can generate strong Kona winds from the south, and land breeze circulations can develop during times of weak tradewind conditions. Meteorological data for 2014 was obtained for the project site. The predominant winds from the northeast, and the strongest winds come periodically from the southwest.

Rain gauge data for a rain gauge located near the site off Mahahu’ulep Road was obtained from NOAA National Climatic Data Center. The data reveal that more than a week of consecutive rain is very unusual for Mahahu’ulep Valley. The rainfall events for 30 years were recorded (a total of 10,957 days from 1984 to 2013) and ranked for 30 years were recorded (a total of 10,957 days from 1984 to 2013) and ranked for precipitation total (MDPR). Data records show only five occurrences in the last 30 years with more than a week of consecutive rain. And rainfall exceeded 2.0 or more inches during only four occurrences, with 2.6 and 3.7 inches recorded (EIS Section 4.1). Average rainfall in Mahahu’ulep is just under 50 inches annually.

Changes to solar radiation and the hydrologic cycle large enough to affect climate would be large-scale and long-term. The scale of HDF is not large enough to influence global cycles of solar radiation and the hydrologic cycle. Minimal construction and an increase in ground cover density will not affect climate conditions over the short-term or long-term. No significant impacts are anticipated, and no mitigation would be required.

SOILS: Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during dryer periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microflora to flourish and diversify. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawai‘i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 32; these practices codes identify design and construction standards related to drainage, materials operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil and Water Conservation District in December, 2013.
The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a "Custom Soil Resource Report for Island of Kaua'i, Hawai'i." The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kahili Clay at 32 percent, Kā'ena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as "poorly drained", and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas "drainage" refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential for impacts on water bodies. In this way, "poorly drained" soils may represent less risk of nitrate and nitrite leaching to associated water bodies than "well drained" soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai'i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbon in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing season. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area's hydrology is shaped by its geology. The Kāʻōla area was built by Nāpali formation lavas of the Waimānalo volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā'ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kāʻōla series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

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The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā’ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material
might discharge into the lower aquifer confined in the unweathered volcanic material at depth. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evaporotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data are to be collected in 2014. The Department of Health (DOH) has required that groundwater in the deep aquifer be monitored. The group reported that quality of water from both groundwater layers is good; however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes.

**Regional Water Demand:** The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,955 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kālāheo districts), use in 2035 is projected to be 3.28 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and preventing the leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health Clean Water Assurance/Quality Control (CWQA/QC) requirements, and it could not be used for regulatory purposes. CWB had collected water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted HDF to conduct a "Sanitary Survey" of the Māhā‘ulepū and adjacent wetlands. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The
The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris, and inputs from existing agricultural operations may all be contributing factors in the indicator bacteria levels at the ditch. The groundwater engineer estimated potential nutrient throughput to the groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as a chronic daily release, rather, episodic and temporary inputs would be conducted during extreme weather events.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area as a highly mixed environment and surface water interaction with the marine water downgradient from the dairy site is not an inviting recreational body of water utilized by people. The operation will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that increases the potential for the ditch. The rapid decrease is likely a result of physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring is included in the Draft EIS as Appendix F, providing additional information.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area as a highly mixed environment and surface water interaction with the marine water downgradient from the dairy site is not an inviting recreational body of water utilized by people. The operation will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that increases the potential for the ditch. The rapid decrease is likely a result of physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring is included in the Draft EIS as Appendix F, providing additional information.
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawai'i Dairy Farms”: http://tinyurl.com/OEQCKUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AKP, LEED AP
Principal Planner

Linda M. Rozelle
1661 Pā'e Rd, Ste. 2301
Koloa, HI, 96756

State of Hawaii, Dept of Health
1250 Punchbowl St.
Honolulu, HI, 96813

✓ Group 7B International, Inc.
925 Bethel St. 5th floor
Honolulu, HI, 96813

Hawaii Dairy Farms, LLC
PO Box 1690
Koloa, HI, 96756-1690

Dear Ladies and Gentlemen:

I wish to express my grave concern over the prospect of an industrial dairy on the south side of Kaua‘i. I have lived in the area for 14 years and have enjoyed the beauty of the water and land. I am concerned about the impact on the ocean, the air, the water supply, and the tourism industry. I am troubled by the use of the word sustainability, since there will be no benefit to the Island, with all milk being transported elsewhere for processing. There are few new jobs projected, with numerous jobs at risk, as nearby hotels suffer the consequences of having several hundred cows within a few miles.

I serve on the board of Directors of a Poipu condominium complex and express the concerns of my fellow owners, as well. Please consider an alternate site for this endeavor.

Yours truly,

[Signature]
May 26, 2016

Linda M. Rozelle
1661 Pe'e Road #2301
Koloa, HI 96756

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Mākāulepū Road
Kaua'i, Hawai'i
TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Linda M. Rozelle:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai'i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua'i, and 8 on O'ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua'i.

The HDF project would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai'i Island), approximately 10 percent of Hawai'i's milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua'i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O'ahu.

HDF is expected to generate a net income of approximately $60,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai'i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua'i, and 2 indirect jobs on O'ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua'i and another 8 indirect jobs on O'ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.
ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules Hawai‘i Administrative Rules Chapter 11-200 (HARS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Renoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing important agricultural lands demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.
• Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

• Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEIC website at the following URL, search "Hawaii's Dairy Farms": [http://tinyurl.com/OGQ63A1A](http://tinyurl.com/OGQ63A1A)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Charles Rullman:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory permits process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**GROUP 70 OBJECTIVITY:** Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai‘i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai‘i Revised Statutes and the “Environmental Impact Statement Rules” (Chapter 200 of Title 11, Hawai‘i Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State and Federal agencies. On numerous past EIS projects, the Hawai‘i Chapter of the American Planning Association has recognized Group 70’s professional work with Chapter awards for excellence in environmental planning. Part of the EIS scoping process involves Group 70’s experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai‘i Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

Hydrology: The area’s hydrology is shaped by its geology. The Kūla area was built by Nāpali formation lavas of the Waimea volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kūla series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanic by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāulepuē Valley and the HDF site ranges from 0.35–50 feet per day. The hydraulic conductivity of soils in the adjacent Kūla–Pōpū region is on the order of 201–500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined the hydraulic conductivity of waterbodies within Māhāulepuē that may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydraulic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.
Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD) of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 94,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Måhá’ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Måhá’ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

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Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water: The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Måhá’ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Måhá’ulepū watershed.

The HDF site is located on the bottom-land of the upper Måhá’ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hā‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Måhá’ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

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Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Måhá’ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people.
Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Library" (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35 feet from the top of drainageway (totaling 70 feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageway; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in adequate supply and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kāloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment:** An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipōlil Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively discharges inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

**Establishment of Water Quality Monitoring:** Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.
Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylot" of confined dairy operations where animals walk over dirt and dry manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂·₅) measured on the island of Kauai, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂·₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4.19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In those periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of meteorological conditions, location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaii Dairy Farms”:

http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
18 Feb 2015

From: Richard Russell
2230 Loke Rd
Koloa, HI 96756

To: Laura McIntyre, Environmental Planning Office
State of Hawai'i Department of Health
1250 Punchbowl Street
Honolulu, HI 96813

Public Comments to Hawai'i Dairy Farms (HDF) Environmental Impact Statement (EIS) Preparation Notice dated January 2015

Dear Ms. McIntyre,

After review of the subject document I wish to submit the attached public comments.

The intent of my comments is to document potential shortfalls in the content of HDF's proposed Environmental Impact Statement (EIS), based upon the information provided in the Environmental Impact Statement Preparation Notice. The comments are not intended to list all the items that should be in an EIS.

Respectfully,

Richard Russell

copy to: Group 70 International, Inc
Hawai'i Dairy Farms, LLC

Comments to Hawai'i Dairy Farms (HDF) Environmental Impact Statement
Preparation Notice dated January 2015 by Richard Russell, 2230 Loke Rd, Koloa HI 96756

1. Request that the EIS specifically address the impact of planned dairy operations on Koloa's water supply. The preparation notice simply states that "Drinking water and irrigation water supply for HDF, and ground water quality will be addressed.". This level of detail is inadequate. In addition, the EIS should:

   a. Define the Federal/State/Local public drinking water standards that must be met.

   b. State the specific mitigation techniques that will be used to prevent HDF operations from contaminating Koloa F well.

   c. Provide the results of studies/analysis required to demonstrate that the proposed mitigation techniques will succeed.

   d. Include how government agencies/HDF will monitor the Koloa F well to verify that the output of the well continues to meet public drinking water standards. What substances will be monitored? How often will the well be monitored? How will the public gain access to the results?

   e. Estimate the impact to Koloa if, despite their best efforts, HDF operations result in the contamination of the Koloa F well. What will be impact on the Koloa/ south shore water supply? Estimated the cost to the taxpayers (County and/or State) to resolve the problem.

2. Project Schedule

   a. The preparation notice states that "Initial operations are permitted to begin with up to 699 cows". Request clarification. Who has permitted HDF to begin operations and when was the permit granted?

   b. The EIS should include an estimate of the minimum number of dairy cows required to operate the dairy farm profitably. This information is critical in determining the likely environmental impact of HDF operations. It is clearly pointless (for both HDF's investors and the public) for HDF to operate at a loss. If HDF's operations are economically feasible at a small herd size then environmental risks can be more efficiently managed (operations can expand gradually based
upon the results of environmental monitoring). If HDF requires all 2,000 cows to turn a profit then environmental risks rise sharply. The economic pressure to expand operations, once started, will be enormous; regardless of the actual environmental damage that occurs.

c. The EIS should be conducted assuming a full herd of 2,000 cows (just confirming what I believe the preparation notice already says).

3. The preparation notice states that field trials of Kikuyu varieties are underway at the site. These trials should be completed prior to approving HDF operations. The results of these trials should support any analysis in the EIS regarding supportable herd size or nutrient uptake calculations.

4. General Comment: Any study cited in the EIS should be available for public review. Request the full study with all study assumptions and technical calculations; not just the study summary or conclusions.

5. Recreational Resources

   a. The EIS should include the impact of HDF operations on recreational activities at Kawai ola Bay and Gillin's Beach. Kawai ola Bay and Gillin's Beach are important recreational areas for the local community. There is public access to these areas.

   b. When addressing recreational impact to the local community the EIS should include all forms of recreation enjoyed by the local community. This includes snorkeling, surfing/body boarding, fishing, spear fishing, swimming and picnicking on the beach.

   c. The EIS should assess whether HDF operations could result in beach closure due to high bacteria counts at any beach along the south Kauai shore to include Kawai ola Bay.

   d. The EIS should assess whether agricultural odor and biting flies caused by HDF operations will impact the ability of the local community to enjoy recreational activities along the south Kauai shore to include Kawai ola Bay.

6. Water Supply. The EIS should estimate the water consumption required for HDF operations and compare this figure to the current permitted water inflow into the Waitia Reservoir. Will HDF operational requirements exceed existing County permits for the amount of surface water that can be diverted into Waitia Reservoir? If so then what is the process by which HDF will gain approval to withdraw additional water from public water sources? If ground water will be extracted what will be the impact to ground water levels or the public water supply to Koloa and surrounding communities?

7. Economic and Social Welfare Impact to the Local Community. The EIS should address the impact of agriculture odor and biting flies caused by HDF operations on the economic and social welfare of the Koloa and Po'ipu area, to include:

   a. The estimated loss of local employment in hotels, golf courses, restaurant, shops and tour companies due to a reduction in tourist traffic.

   b. Estimated loss in State and Local tax revenues generated by the tourist industry.

   c. Estimated loss of income of to local business owners dependent upon the tourist industry.

   d. The quality of life to local residents (very few of whom live indoors with the windows shut).

8. Additional Agricultural Odor and Biting Flies Comments

   a. The EIS should state specifically what actions will be taken to control agricultural odor and biting flies.

   b. A clear definition of what is considered an "acceptable" level of odor and biting flies should be developed for public comment. I am unclear if this should be proposed by HDF in the EIS or if the Approving Agency (State of Hawaii, Department of Health) should provide this guidance to HDF up front.

   c. The EIS should state how HDF will monitor agricultural odor and biting fly levels. How will the monitoring be accomplished? Where will monitoring be performed? Who will perform the monitoring? How will the public gain access to the results?

   d. The EIS should state what action HDF will take if monitoring shows that acceptable levels of odor or biting flies are being exceeded as a result of HDF operations.
Dear Richard Russell:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai'i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā'ulepū Valley on the island of Kauai to produce fresh, locally available nutritious milk for Hawai'i families. The rotational-grazing method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a "zero-discharge, grass-fed dairy". The term "zero-discharge" under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows' manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term "zero discharge" as it was construed as no nutrients into the system.

The term "grass-fed" was used in the HDF EISPN. This term was used to identify HDF's intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds' diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of "grass-fed". The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these come from animals raised on pasture on a forage-based diet. Due to the evolving definition of "grass-fed", the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area "footprint" will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd's primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient "dry matter" grass yields essential to a cow's diet. Additional project-specific trials at the Māhā'ulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows' diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as "mob", mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the
energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reserve, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or dilute effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to the ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāʻulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd. Heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhāʻulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila musaphilia, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-ʻōhiʻa forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950
to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhā‘ulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung piles in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōloa-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Aha Kino‘iki Road between Kōloa and Po‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animals within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. Ongoing dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 5 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $80,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waima‘a volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths - as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 50 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa
series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanic rocks by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. Hydraulic conductivity of the alluvium that underlies Māhāulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (mgd), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 mgd). These demands are a small fraction of the 3 mgd produced by the on-site, existing Māhāulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāulepū 14 well and the County's Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Poipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa–Poipū–Kalāheo districts), water use in 2035 is projected to be 3.24 mgd, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāulepū watershed.

The HDF site is located on the south-land of the upper Māhāulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāulepū Road. This ditch, named Waiopūlī Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and

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HDF operations will follow the practice standards of the Natural Resources
Conservation Service (NRCS). These practices include setbacks to reduce runoff that
could carry particles into surface waters. Fences will be erected 35-feet from the top
of drainageway (totaling 70-feet in width) to keep cows away from surface waters.
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create filter strips that could capture particulates during stormwater runoff events.
Another setback restricts application of effluent within 50 feet of the drainageways;
only irrigation water will be used in these areas as needed to maintain the vegetated
buffer and pasture grass, keeping nutrient applications away from waterways.

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching
activities are exempt from the Clean Water Act Section 404. HDF received
confirmation of exemption for maintenance of existing drainage ditches from the
Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional
practices are anticipated to fall under the exemption for construction or
maintenance of existing or new animal walkways, stream crossings, and farm roads
in accordance with best management practices.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch
and concerns about the proposed dairy prompted CWB to conduct a “Sanitary
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within the Waiopili Ditch and areas upstream, and initiated a series of investigations
into water quality issues. Following EPA standards for a Sanitary Survey, DOH has
completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The
Sanitary Survey found no significant impact to the ditch from any activity that could
be attributed to the dairy. Feral animal waste, decaying organic debris and inputs
from existing agricultural operations may all be contributing factors in the indicator
levels found in ditches runni¢¢ǮóǤ 
the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce
bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private
property, and is not an inviting recreational body of water utilized by people. The
Sanitary Survey can be accessed on the DOH Clean Water Branch website under

Impacts to the Nearshore Marine Environment. An assessment of groundwater and
surface water interaction with the marine water downgradient from the dairy site
was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the
Waiopili Ditch provides the majority of freshwater input in the immediate coastal
area. Water chemistry measurements made by MRCI identified mixing of ditch
water occurs rapidly and within a short distance of the shoreline.

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also calculated. Nitrogen input to the marine environment in t ᦣó  
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potential nutrient throughput from HDF. Phosphorus for both domestic wastewater
and landscape fertilization in the region is estimated to be 1,260 pounds annually,
or 1.4 times greater than the potential discharge from HDF. The nutrient inputs
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mitigation is applied to reduce the quantities.

The groundwater engineer estimated potential nutrient pass-through to
groundwater from the HDF nutrient budget at two percent of nitrogen (totaling
10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per
year). Again, this nutrient run-off would not occur as chronic daily release, rather,
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inches. Such rainfall events are estimated to occur approximately three percent of
days, or an average of 10 days annually. Per best practices, no effluent application
would be conducted during such weather events.

The groundwater and surface water analysis conducted for the Environmental
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times more nutrients than groundwater, due to the poor permeability of the
alluvium. Groundwater can discharge from the alluvium when it rises in wetter
periods and intersects the deep drainage ditches. Such discharge to the channels
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Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The
natural fertilizer from manure deposited directly to pasture and effluent collected
from the milking parlor is insufficient to meet the agronomic need of the pasture
grass crop with the committed herd size of 699 mature dairy cows, and
supplemental commercial fertilizer will be required. Nutrients required to sustain
the 470 acres of pasture are the same for the future contemplated herd size of up to
2,000 mature dairy cows, though the proportion of nutrients supplied as natural
fertilizer (manure and effluent) and commercial fertilizer changes. With the
potential future contemplated herd size, supplemental nitrogen will be needed, and
a small excess of phosphorus could occur. However, with an increase in dry matter
(DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in
a deficit and require commercial supplementation. Grass yields are anticipated to
increase more than three tons DM per acre with dairy establishment, from the
current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS
provides additional information.

prohibiting leaking or poorly-maintained construction equipment and machinery.
Structural controls to be utilized during construction will include: silt fence installed
in key locations; sand bags barriers in swales; and geotextile filter fabric and
sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began
collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi
Cave Reserve in April of 2014. The group reported high levels of enterococcus to the
State Department of Health (DOH) and provided its data, however, DOH was unable
to utilize the data as it did not meet Clean Water Branch (CWB) quality
assurance/quality control requirements, and it could not be used for regulatory
purposes. CWB had not conducted water quality sampling for either nearshore
recreation waters at the terminus of Waiopili Ditch, or of surface waters in the
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Richard Russell
May 26, 2016
Page 10 of 13

Richard Russell
May 26, 2016
Page 9 of 13


The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kauai community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. ER sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai'i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlour. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours ~ in two separate milking cycles ~ moving to and from the barn for the 10- to 15-minute milking session.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua'i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-
third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawaii Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

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From: Joe Sauve <jisauve@olympus.net>
Sent: Friday, February 20, 2015 1:24 PM
To: epo@doh.hawaii.gov
Cc: HDF
Subject: Dairy Farm EIS

Good afternoon the 20th of Feb., 2015.

I attended the community meeting last evening in Koloa Elementary School. The informational meeting was organized so that company people (4) stood one in each corner of the room. It was very difficult to get to them for the crowd. If one could finally get to them the only information given out was the company line, very little real discussion. I have a degree in Soils and one in Entomology as well. I was president of an agricultural company for 24+ years. The EIS will address the water containment and controlled discharge of process water I am sure. I doubt seriously the dairy will have a process water discharge permit as required. This needs to be addressed and confirmed that they were successful in acquiring one. I farmed papaya’s (25 acres) on the proposed site. Once in a while we would get excess rain water that would accumulate to more than one foot over most of the land. The perk is very weak in the area, so the excess water ran off. I will again.

Now on another matter the public should see a pro forma operating statement and long term projected income statement. I know the project has that or they would not be investing $ to lose it. This information would project the likelihood of a successful and sustainable operation for 10 years. While no project is guaranteed to be successful, due the serious environmental impact should the project fail and be abandoned, it should be required for the parties to mitigate the impact and be responsible for cleanup to be secured by performance bonds in favor of the County. That would secure a secondary source of recovery to restore the area in that event. This should be an integral part of the FEIS.

I support agriculture and have many years of experience working with farmers. I support Dairy farming as any other Ag Project. It is the opinion of this writer however that the site selection is basically flawed and better sites could be found that would not be such a hazard to the environment.

Respectfully;

Joe Sauve
742-1558
5143 Hoona Rd.
Koloa, HI
I attended the Koloa school "community" meeting. Of course it was a Jr. High School show that the dairy should be ashamed of and it was an insult. Now with that aside, I do have experience in developing an EIS and being on the dairy side. One of the things that must be incorporated is the "Wind Rose". It is a computer program that will incorporate NOAA wind data into projections of frequency of odors from all directions on homes businesses and population. The cost is very reasonable and no EIS would be complete without it. To produce an EIS of this project without using this tool would be incomplete, inadequate, irresponsible and unacceptable. We were told at the meeting that all suggestions made would be incorporated in the EIS. I will be looking for it.

Joe Sauve
Koloa
a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD). The project’s water use is within the state-mandated 3 MGD installed on the Māhāulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāulepū Valley, which is fed by several intermittent streams coming off the south slope of the Hā’upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction
Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā'ulepū Surface Water Hydrologic Unit as the remote area are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhā'ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā'ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Library" (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā'ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur on a chronic daily basis; rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po'ipū region were also calculated. Nitrogen input to the marine environment in the Po'ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment:** An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal...
area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline. The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kauai community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. ER sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours in two separate milking cycles—moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂·₅) measured on the island of Kauai, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the Standard of 150 μg/m³ The estimated concentration for PM₂·₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy feedlots and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.
Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 280 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

**ALTERNATIVES:** As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action's purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The DEIS evaluates alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. These include public land for resort or residential development, or a potential condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua'i; and (3) milk products processing by HDF. The alternative of "No Action" is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai'i, with the capability to produce 10 percent of the State's fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua'i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3).
- However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai'i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai'i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai'i, with the capability to provide more than 1,000,000
gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

- The planned action will generate new long-term employment in the agricultural sector on Kaua'i, including pasture agronomy, soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai'i Dairy Farms": http://hawaii.com/ORECKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear William Schimmelfennig:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. HDF is committed to establishing a herd of up to 100 dairy cows as a sustainable small-scale dairy farm. This farm is planned to be located outside of the area identified as the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

SOILS:

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as "poorly drained", and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with increasing management stress. Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas "drainage" refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity or a slow rate of groundwater movement through the soil. This slow movement can cause more water to move through or from the soil profile, which results in increased nutrient leaching to associated waterbodies, including surface water and groundwater. In this way, poorly drained soils tend to result in increased leaching of nutrients to surface water and groundwater.

HDF will continue to monitor and manage soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the Soil Conservation Service have been reviewed and will guide future nutrient management practices.

Sustainability is a core principle behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agriculture, conservation implementation. Conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a "Custom Soil Resource Report for Island of Kaua‘i, Hawai‘i." The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by the USDA NRCS, however in-field soils testing is needed to identify existing soil nutrient levels and demonstrate the pasture-based system as an economically and environmentally healthy, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help identify levels of pH, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate size of 699, HDF will contemplate the possibility of expanding the herd in the future.

The NRCS soil classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and demonstrate the pasture-based system as an economically and environmentally healthy, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help identify levels of pH, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrated size of 699, HDF will contemplate the possibility of expanding the herd in the future.

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In this way, "poorly drained" soils may represent less risk of nitrate and nitrite gases, which affects the potential for impacts on waterbodies.

HDF is committed to establishing a herd of up to 100 dairy cows as a sustainable small-scale dairy farm. This farm is planned to be located outside of the area identified as the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

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In this way, "poorly drained" soils may represent less risk of nitrate and nitrite gases, which affects the potential for impacts on waterbodies.
As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to absorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawaii soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health.

NATURAL HAZARDS: The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhāʻulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai‘i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone. The Kaua‘i and N‘ūliai region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands.

Although they occur infrequently, Kaua‘i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhāʻulepū region during and following the hurricanes that affected Kaua‘i in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhāʻulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua‘i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Nāpali formation lavas of the Waima Volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa–Pōpū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.
The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā'ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai'i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā'ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā'ulepū 14 well and the County's Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā'ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water, in keeping with the State Department of Health (DOH) regulations. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and shallow groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua'i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po'ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua'i will increase county-wide by 17,300 residents by 2030. The South Kaua'i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua'i region (the Kōloa - Po'ipū - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island's infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā'ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā'ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā'ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha'upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā'ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for a Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua'i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā'ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhā'ulepū and adjacent watershed. DOH conducted water sampling...
within the Waipio Ditch and areas upstream, and initiated a series of investigations
into water quality issues. Following EPA standards for a Sanitary Survey, DOH has
completed Part I of its report: Waipio Ditch Sanitary Survey, Kauai, Part I. The
Sanitary Survey found no significant impact to the ditch from any activity that could
be attributed to the dairy. Feral animal waste, decaying organic debris and inputs
from existing agricultural operations may all be contributing factors in the indicator
levels found in ditches running through Māhāʻulepū Valley. The dense canopy along
the makai end of Waipio ditch blocks ultraviolet rays, which could help reduce
bacteria levels. CWB noted that Waipio Ditch is a man-made drainage on private
property, and is not an inviting recreational body of water utilized by people. The
Sanitary Survey can be accessed on the DOH Clean Water Branch website under

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching
activities are exempt from the Clean Water Act Section 404. HDF received
confirmation of exemption for maintenance of existing drainage ditches from the
Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional
practices are anticipated to fall under the exemption for construction or
maintenance of existing or new animal walkways, stream crossings, and farm roads
in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources
Conservation Service (NRCS). These practices include setbacks to reduce runoff that
could carry particles into surface waters. Fences will be erected 35-feet from the top
of drainageway (totaling 70-feet in width) to keep cows away from surface waters.
Vegetated buffers will be established between the fences and drainageways to
create filter strips that could capture particulates during stormwater runoff events.
Another setback restricts application of effluent within 50 feet of the drainageways;
only irrigation water will be used in these areas as needed to maintain the vegetated
buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The
nutrient fertilizer from manure deposited directly to pasture and effluent collected
from the milking parlor is insufficient to meet the agronomic need of the pasture
growth crop with the committed herd size of 699 mature dairy cows, and
supplemental commercial fertilizer will be required. Nutrients required to sustain
the 470 acres of pasture are the same for the future contemplated herd size of up to
2,000 mature dairy cows, though the proportion of nutrients supplied as natural
fertilizer (manure and effluent) and commercial fertilizer changes. With the
potential future contemplated herd size, supplemental nitrogen will be needed, and
a small excess of phosphorus could occur. However, with an increase in dry matter
(DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in
a deficit and require commercial supplementation. Grass yields are anticipated to
increase more than three tons DM per acre with dairy establishment, from the
current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS
provides additional information.

The groundwater and surface water analysis conducted for the Environmental
Impact Statement estimated that surface water from Māhāʻulepū will carry three
times more nutrients than groundwater, due to the poor permeability of the
alluvium. Groundwater can discharge from the alluvium when it rises in wetter
periods and intersects the deep drainage ditches. Such discharge to the channels
could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to
groundwater from the HDF nutrient budget at two percent of nitrogen (totaling
10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per
year). Again, this nutrient run-off would not occur as chronic daily release, rather,
the runoff contributions would be limited to periods of the major rainfall over 0.8
inches. Such rainfall events are estimated to occur approximately three percent of
days, or an average of 10 days annually. Per best practices, no effluent application
would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Poipū region were
also calculated. Nitrogen input to the marine environment in the Poipū region is
calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of
potential nutrient throughput from HDF. Phosphorus for both domestic wastewater
and landscape fertilization in the region is estimated to be 1,260 pounds annually,
or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from
domestic uses in the Poipū region are constant throughout the year and no
mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and
surface water interaction with the marine water downgradient from the dairy site
was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the
Waipio Ditch provides the majority of freshwater input in the immediate coastal
area. Water chemistry measurements made by MRCI identified mixing of ditch
water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just
10 days annually from dairy operations will not adversely affect ocean water quality
and the marine environment. The nearshore area is a highly mixed environment
which actively disperses inputs within several meters from shore. Comparing
nutrient constituents in surface water samples taken from the HDF site and the
agricultural ditches down gradient to nutrients sampled in the nearshore ocean
water revealed that indicator bacteria were substantially lower in the ocean than in
the ditch. The rapid decrease is likely a result of both physical mixing of water
masses and toxicity from saline water. In any event, the elevated levels of indicator
bacteria do not extend beyond the shoreline. Baseline water quality data and the
surface and marine water impact report is included in the Draft EIS as Appendix F.
Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB dairy neighbors and the local Kaua‘i community.


Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AIA, LEED AP
Principal Planner
Dear Ken and Stephanie Schwartz:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

Your comments were received by the State of Hawaii Department of Health Environmental Planning Office. The Department of Health forwarded a copy of your comments to Group 70 International in order to be included in the Draft Environmental Impact Statement (EIS) analysis. This letter was prepared in response to your comments.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawaii. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**HAWAII COASTAL ZONE MANAGEMENT PROGRAM:** Draft Environmental Impact Statement (EIS) Section 5.1 addresses the project's consistency with the Coastal Zone Management Act (CZMA). In 1972, the Federal government enacted the CZMA to effectively manage, use, protect, and develop coastal areas in the U.S. The CZMA was a government response to increasing and competing demands upon habitats and resources of coastal lands and waters. Such demands often resulted in a loss of living marine resources and wildlife; depleted nutrient-rich areas; shoreline
erosion; diminished open space for public use; and permanent and adverse changes to ecological systems. Under the CZMA, States are authorized to work in a unified manner with Federal and local governments to develop programs, policies, evaluation criteria, development standards that lend to the effective protection and prudent use of coastal lands and waters. The enforcement authority for the Federal Coastal Management Program (Public Law 104-150, as amended in 1996) has been delegated to the State of Hawai‘i under HRS Chapter 205A, CZM Program.

In 1990, Congress enacted the Coastal Zone Act Reauthorization Amendments (CZARA) by adding a new Section 6217 “Protecting Coastal Waters,” which requires that each State with an approved coastal zone management program submit a Coastal Nonpoint Pollution Control Program (CNPCP) to EPA and NOAA for approval. The Hawai‘i CNPCP follows a Watershed Approach, and activities are coordinated through Hawai‘i’s Implementation Plan for Polluted Runoff Control and considerations for Stormwater Management.

Hawai‘i Dairy Farms is located within the CZMA, which is defined by the State of Hawai‘i as encompassing the entire state. The project improvements are designed to conform to the goals, policies, and objectives of Hawai‘i’s CZM Program. The Proposed Project’s consistency with CZMA programs and policies to protect coastal lands and waters is documented in the specific resource chapters in EIS Sections 3 and 4, including significant measures to minimize or mitigate potential non-point source pollution impacts to the aquatic resources and nearshore coastal waters.

Designation of the Special Management Area (SMA) is left to the discretion of each county, provided that the SMA include lands extending “not less than 100 yards inland from the shoreline” including undeveloped lands surrounding bodies of surface water subject to salinity intrusion or tidal influences and the waters themselves”. Per the County of Kaua‘i, this project is not located in the SMA.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Janette Shablow
shablow@gmail.com

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Janette Shablow:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built upon Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths— as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary erptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the soil. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 105 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the onsite, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Janette Shablow
May 26, 2016
Page 2 of 6
T h o u g h t h e  w a t e r b o d y  i n  w h i c h  t h e  C o u n t y  w e l l s  o c c u r  i s  c o n f i n e d and exposure of disturbed surfaces; monitoring and repair of structural controls; and established a 1,000-

Structural controls to be utilized during construction will include: silt fence installed

an animal will deposit manure as the area will not be used for grazing. Additional

sediment logs around drain inlets.

Groundwater Monitoring: Four groundwater monitoring wells were installed by

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began HDF into the shallow groundwater within the alluvium to allow monitoring of water
collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water assurance/quality control requirements, and it could not be used for regulatory

recreation waters at the terminus of Waiopili Ditch, or of surface waters in the

Regional Water Demand:

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch

The State Department of Economic Development and Tourism (DBEDT) projects the

- wide by 17,300 residents by 2030. The

duction is estimated to reach 16,855 in 2035, when it is projected to the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce

The State Department of Land and Natural Resources Commission on Water

Resource Management has established surface water hydrologic units for managing

"Library" (http://health.hawaii.gov/cwb).
only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be required, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūuleipāi will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kāhoa-Po'ipū region were also calculated. Nitrogen input to the marine environment in the Po'ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kauai community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawai’i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
RESPONSE TO HAWAII DAIRY FARM'S ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

February 20, 2015

Dear Sir, Ma'am:

I am very concerned about the proposed industrial dairy at Maha'ulepu Valley. The area around and including Maha'ulepu Beach and Makau-wahi Sinkhole is a treasured recreational area with significant cultural history.

Wai-o-pili Stream is already one of the most polluted streams on Kauai. It would seem more appropriate to deal with the existing environmental problem than to propose making the problem worse. This is a public health problem.

I am in full support of increasing the agricultural production on the island, and making Kauai more independent in terms of food and dairy. There are many other more appropriate sites on the island without risking a major disaster.

The risk of pollution is not just Maha'ulepu, once in the stream or in the wells the risk is to drinking water for Kohola and Poipu. The risk is odor and flies on the South Shore. In addition to the cultural and recreation risk, there is significant economic risk to the entire island. Tourism is a major part of the local economy. Poipu is a significant part of that tourism. As the word of the dairy gets out Kauai will likely suffer a major drop in tourism.

My wife and I have spent our winters in Poipu for more than 10 years and have vacated here for 16 years. We chose Kauai because of the pristine beauty of the island. Many of our friends and family visited Kauai for the first time to visit us. Most have returned at least once, and many more than once. We feel we have contributed to the economic well being of Kauai. We have friends on Kauai with similar stories. Putting a major dairy farm in a fragile area puts that economic benefit at great risk.

Please find a more suitable location with a lower density of cows. Protect this precious island. Protect the citizens of Kauai. Protect the wildlife in the ocean.

Respectfully,

Jamie H. Shaffer
1565 Pe'e Road #514
Koloa, HI 96756

May 26, 2016

Jamie H. Shaffer
1565 Pe’e Road #514
Koloa, HI 96756

Subject: Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice
Maha‘ulepu Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Jamie H. Shaffer:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

ARCHAEOLOGICAL AND CULTURAL: The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the

Group 70 International • 495 Bailey Street, 5th Floor • Honolulu, HI 96813-4307 • tel. 808.523.5866 • fax. 808.523.5874 • www.group70int.com
extended survey area. Only one of the sites is believed to be associated with pre-
contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau,
and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of
the project area. The remaining sites consist of historic-era bridges, ditches, culverts,
retaining walls, and a flame system dating from the 20th century and are affiliated
with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not
surprising, given the massive landscape modifications that occurred during intensive
sugarcane cultivation on the valley floor. Even historic era cultural materials
associated with the many Land Commission Awards in the project area were non-
existent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the
archaeological consultant and the dairy project is anticipated to have no impact on
these sites. No further archaeological work is recommended for the sites. Two of the
sixteen sites are considered significant under multiple criteria, but occur outside the
project area on lands owned by a different landowner. Both sites will not be adversely
affected by the proposed dairy project. No site is related to burials, and no bonex
were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural
resources, practices or beliefs, its potential to isolate cultural resources, practices or
beliefs from their setting, and the potential of the project to introduce elements
which may alter the setting in which cultural practices take place. Information
received from the community indicates the Māhūlelehi Ahupu‘a, has been and is
currently used for traditional cultural purposes. However, the dairy project area has
not been included in these activities. It is clear that the gathered plants, trails, State
Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved
petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of
the leased premises, which will ensure that project activities and any related impacts
are contained within the project area. Based on the research and comments received
from the community, it is reasonable to conclude that, pursuant to Act 50, the
exercise of native Hawaiian rights or any ethnic group related to numerous
traditional cultural practices will not be impacted by establishment of the dairy.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms
(HDF) to the existing economy were evaluated in the Draft Environmental Impact
Statement (EIS), including a fiscal impact assessment report completed in April,
2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and
economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local
construction personnel and local material suppliers. Such jobs would include
equipment operators, cement workers to lay foundations, metal workers,
carpenters, plumbers, electricians, roofers, supervisors, painters etc. Based on State
employment multipliers, indirect employment related to Dairy construction would
be expected to average about 16 jobs on Kau‘a‘i and 8 on O‘ahu. Construction
employment would be expected to average about 12 jobs per year during the
development period. Thus direct-plus-indirect employment association with
construction would be expected to average approximately 36 jobs, of which 28
would be on Kau‘a‘i.

The HDF project would contribute to diversification of Kau‘a‘i’s economy, which is
heavily based on the visitor industry. With only two dairies remaining in the State
(both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally
supplied. The HDF project, with an established herd of up to 699 mature dairy cows,
will increase the supply of local fluid milk by approximately 1.2 million gallons of
milk annually, a 50 percent increase in statewide milk production. On-going dairy
operations at the committed herd size will provide approximately 16 direct and
indirect full-time equivalent jobs on Kau‘a‘i, including 5 farm jobs and about 11
indirect jobs. An additional 6 indirect jobs related to on-going dairy operations
would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County
when the 699 cow herd is established. When the dairy has matured to full
production for the 699 cow dairy, net income to the State is calculated at $160,000
annually. With the potential contemplated herd size of up to 2,000 mature dairy
cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be
produced. This would double local milk production currently supplied by operational
dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the
contemplated 2,000 mature dairy cow herd is estimated at approximately 3
construction jobs plus 4 indirect jobs on Kau‘a‘i, and 2 indirect jobs on O‘ahu for a
total increase of 9 jobs. For on-going operations at the contemplated herd size, an
additional 5 full-time farm jobs would be added, with approximately 15 additional
indirect jobs on Kau‘a‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of
approximately $8,000 for improvements related to expansion for the contemplated
herd size of up to 2,000 mature dairy cows ($76,000 total) versus $68,000 for the
committed herd size). The State will derive approximately $360,000 annually in
revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated
nuances that could affect property values as a result of dairy implementation or
operations. No noticeable odors, flies, noise, waste or water discharges will impact
resort or residential areas. As such, the dairy will not adversely affect residents,
neighboring recreational activities, guests in nearby resorts, or diminish property sales
or property values in the area.
WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined; and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waima volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths - as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black alky day and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move through the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Milk rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the Guany drinking water well.

Regional Water Demand: The adjacent, developed Kōloa-Poipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Poipū - Kalihewa districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface...
Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhūʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhūʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhūʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhūʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhūʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part 1. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhūʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. TheSanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 15-feet from the top of drainage ditches to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield [a measure of grass growth] of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 423 of the BS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.
To provide perspective, nutrient inputs from the adjacent Kīloa-Po'i'ipu region were also calculated. Nitrogen input to the marine environment in the Po'i'ipu region is calculated to be 38,510 pounds annually, or 35 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'i'ipu region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downdgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipio Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua'i community.

ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action's purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action's purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai'i Administrative Rules Chapter 11-200 (HRS 11-200) require a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoned the land for resort or residential development, a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua'i; and (3) milk products processing by HDF. The alternative of "No Action" is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements:

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai'i, with the capability to produce 10 percent of the State's fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term...
employment in the agricultural sector on Kaua'i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.

- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai'i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai'i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai'i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply land tenure, and availability and accessibility (Criterion 1).

- The planned action will generate new long-term employment in the agricultural sector on Kaua'i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawai'i Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
1763 Pe'e Road, #503  
Koloa, HI 96756  
February 23, 2015

Laura McIntyre  
State of Hawai‘i  
Department of Health  
1250 Punchbowl Street  
Honolulu, HI 96813

Group 70 International, Inc.  
925 Bethel Street, 5th Floor  
Honolulu, HI 96813

Jeff Overton  
Hawai‘i Dairy Farms, LLC  
P.O. Box 1690  
Koloa, HI 96756-1690

RE: Proposed Industrial Dairy at Mahaulepu

To Everyone Concerned:

My husband and I are kama‘āinas. We have owned our condominium overlooking the ocean at Poipu since 1995. We love Kauai so much that in 2006 we gave up our home on the mainland to live here full time. It has always been our desire and intention to live out the rest of our lives in this home.

Now we are faced with the possibility that this will not be practicable. Our personal concerns are myriad. Based upon the scientific studies we have read, we believe: 1 – our drinking water will be contaminated; 2 – the ocean will be contaminated and unsafe for swimming/snorkeling [one of my favorite activities]; 3 – the ongoing foul odor will be unbearable; 4 – the tsetse flies will be a constant nuisance and carry disease; 5 – tourism, the economic lifeline of the south shore, will wither and die; 6 – our financial investment in our home will be totally lost.

We are also concerned about the destruction/extinction of indigenous birds and fish as well as of valuable archeological sites.

We are not opposed to the establishment of a dairy farm located in a suitable area. We are opposed to an industrial dairy factory located at Mahaulepu.

We are in complete agreement with all of the concerns so well expressed by Charlie Tebbutt, Esq. Please consider his letter [attached] as part of ours.

We are appalled at the “blindness” of the people who are charged with protecting our environment. To date all of the scientific evidence indicating that Mahaulepu is the wrong location for this industrial dairy has been totally ignored.

We were happy to read that HDF will have an EIS done, until we learned that they have selected the same firm that wrote their original proposal [Group 70] to conduct the EIS. THIS IS BLATANTLY A CONFLICT OF INTEREST AND SHOULD NOT BE ALLOWED. We ask the DOH to fulfill its fiduciary duty to the people of Kauai by requiring HDF to have the EIS done by an impartial firm. We further request that the DOH take cognizance of the vast environmental harm that will be done to our island if the plans for this dairy ever come to fruition, and take whatever means are at its disposal to halt this project permanently.

Respectfully,

Dr. Irene R. Sherman

Douglas A. Sherman

Dr. Irene R. Sherman
Douglas A. Sherman
February 23, 2015

Via Certified Mail. Return Receipt Requested:
Laura McIntyre
State of Hawai‘i
Department of Health
1250 Punchbowl Street
Honolulu, HI 96813

Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, HI 96813

Jeff Overton
Hawai‘i Dairy Farms, LLC
PO Box 1690
Koloa, HI 96756-1690

Also via e-mail to: HDF@Group70.int.com
laura.mcintyre@do.hawaii.gov


Dear Ms. McIntyre,

This firm represents the Friends of Māhā‘ulepu (hereinafter abbreviated as “FOM”). FOM is a grassroots, not-for-profit corporation dedicated to protecting and preserving the Māhā‘ulepu Valley and Kaua‘i. In furtherance of its mission, FOM hereby submits its scoping comments concerning Hawai‘i Dairy Farm’s (“HDF”) January, 2015 “Environmental Impact Statement Preparation Notice” or “EISPN.” After reviewing and responding to these comments, FOM believes that the State, the Department of Health, and HDF will recognize that the construction and operation of a 2,000-head dairy farm on Kaua‘i’s south shore will cause irreparable environmental, economic, and social harm. These harms far outweigh any of the alleged benefits of a dairy of this size being operated within the State of Hawai‘i – especially considering that HDF will need to ship all of the milk produced by its herd off the island of Kaua‘i for processing and bottling.

As an initial matter, FOM is very concerned that HDF is using the HEPA process merely to justify its already decided position that it will build a dairy at this location. The EIS process, of course, is designed to determine whether an action should occur given the environmental, social, economic, and cultural impacts. HDF has put the cart before the horse, assuming that approval for an already decided project will occur. The EIS process is not intended to be used as a justification for a decision already made. This is not the way HEPA works, and FOM anticipates that HDF will reconsider its position once the full gamut of negative consequences of a large dairy being placed in the Māhā‘ulepu Valley come to light.

In addition to a proper HEPA process, HDF must research the various local, state, and federal ordinances, statutes, and regulations that may impose additional requirements on its proposed dairy operations. HDF identified some of these in its EISPN, including the Hawai‘i Constitution, Clean Air Act, and Clean Water Act. EISPN at 5-1. The EISPN did not list the Endangered Species Act, 16 U.S.C. § 1531 et seq., even though HDF is aware of at least four native bird species that are listed by both federal and state statutes as endangered. EISPN at 3-2.

FOM’s scoping comments below focus on both the EISPN and HDF’s “Waste Management Plan,” dated July 23, 2014. Both of these documents should be considered in the EIS process. FOM also hereby fully incorporates into its scoping comments the critique and review of HDF’s Waste Management Plan by Mr. Mark Madison, dated August 21, 2014 and those by Dr. Deanne Meyer, dated August 11, 2014. These documents were submitted to the Wastewater Branch of the Department of Health by Goodwill Anderson Quinn & Stifel, on behalf Kaua‘i Development LLP.

I. HDF’s Proposed Dairy Would Contaminate the Environment.

Despite touting that the dairy will originally house only 699 animals,1 HDF’s Waste Management Plan (“WMP”) clearly indicates that this facility is being designed from the ground-up to handle 2,000 head. A November 25, 2014 press release from HDF confirms that the dairy intends to expand its herd within months of beginning operation. As such, 2,000 head should be the number that is evaluated throughout this EIS process, not the deceptively low 699 figure used by HDF in its paperwork.

1 699 animals is no arbitrary number. HDF picked it as a starting point to avoid being labeled as a “large” dairy animal feeding operation under federal law. That threshold is reached when, inter alia, a dairy has 700 mature dairy cows housed on site.
Even at 699 animals, however, there can be little doubt that this facility will cause and contribute to the contamination of the environment in and around the Māhū’ulepu Valley and Kaua’i’s sensitive marine ecosystem. Dairies such as that proposed by HDF have been found across the country to contaminate surface water, groundwater, soil, and air. These negative environmental consequences primarily stem from the fact that a mature dairy cow produces significantly more waste than other animals. In fact, the U.S. Environmental Protection Agency estimates that a facility with 2500 dairy cattle creates a similar waste load as a city of 411,000 people. This means that HDF’s 2,000 dairy cows will produce, on average, the same amount of waste generated by a human population of 328,800. By way of comparison, the entire population of Kaua’i is 65,689 as of 2008. Stated differently, HDF’s proposed dairy would create five times more waste than the entire human population of Kaua’i. Unlike human waste, however, which is required to be treated, HDF will dump the waste created by its herd directly onto the 517 acres of land it has secured for grazing.

The pollution that originates from HDF’s proposed facility will impact a variety of environmental media. Each is discussed in turn below, and each must be fully addressed by HDF in its EIS.


HDF’s proposed 2,000 head dairy will cause contamination of surface waters—waters that eventually discharge into the ocean near Gillin’s beach. Figure 3 of the WMP show both natural watercourses and man-made ditches traversing the proposed HDF site. These watercourses can properly be construed as “Waters of the State,” as well as “Waters of the United States,” protected by water quality standards. All of these ditches eventually lead to a stream that discharges into the ocean just a short distance away. Importantly, the area where the discharges will occur has been designated as Class 1 critical habitat by the State. Critical Plant Habitat and Critical Cave Habitat designations also crisscross this coastline. In addition to these waters, there are two identified wetlands on the site, each of which receive runoff and likely groundwater originating from the pastures.

HDF offers absolutely no analysis of how manure-contaminated water will impact the coastline, the critical habitat designations, or the Class 2 inland water that leads to the Class A marine waters along the Māhū’ulepu coastline. HDF also offers no analysis or explanation for how it will prevent such surface water discharges. It suggests that it will conduct surface water monitoring at various points, but not whether it will take steps to eliminate discharge if manure-related pollutants are detected in the samples.

This is not surprising. Dairies across the United States have been subject to Clean Water Act lawsuits for manure-related discharges into surface waters, which cause a laundry list of negative environmental and health effects. This is especially true when soils contain clay, or are classified as “poorly drained” or unsuitable for receiving large amounts of animal waste by the Natural Resources Conservation Service (“NRCS”). Sloped locations, such as exist on the site, present a high likelihood of irrigation water and/or manure water runoff.

Here, the HDF site is composed of soils identified as “poorly drained” by NRCS, including Ka‘ena Clay and Kalāhi Clays soils, which comprise approximately 60% of the total soil. In fact, according to a NRCS custom soil resource report for the project area, virtually all of the soils underlying the site have “very limited” capacity for disposal of manure through irrigation. “Very limited” soils have “limitations [that] generally cannot be overcome without major soil reclamation, special design, or expensive installation measures...[poor performance and high maintenance can be expected.” HDF ignores this point, insisting that the soils in the facility area are conducive to manure applications, which is simply not true. HDF should be required to conduct a detailed soil survey of the site to evaluate whether manure can be applied to its fields in a manner that is environmentally protective. Based on the NRCS soil survey, this does not appear likely.

Additional soil complications can be traced to the soil’s high susceptibility to surface water runoff. Again, the NRCS states that the various soil types in the project area have anywhere from a “medium” to “very high” likelihood of surface runoff. This means that any excess water left on a field from manure applications and/or irrigation water applications can transport water—and the manure constituents contained therein, including those deposited by the herd within each pen—into surface waters and, from there, into the ocean.

Finally, the topography of the site also presents risks to surface water. Water naturally flows downhill. HDF’s WMP contains a topographical map and narrative explaining how the project site slopes downhill from 150 feet elevation, to 60 feet in elevation, and finally to sea level. Manure-contaminated water will therefore flow naturally to the low points—the ditches and canals—where it will then follow the predominant surface water flow into the ocean.

Besides runoff from fields to which manure is applied, there is also a distinct concern that precipitation will also convey nutrients from the fields and into surface waters—including the various wetlands located on and around the site. While HDF claims that it will apply manure with an eye toward the weather, as any resident of the area knows, storms can be unpredictable and deposit substantial amounts of rainwater over a very short period. This also applies to HDF’s proposed storage lagoons, divided into a solids settling basin and a storage pond. The settling basin will be full nearly 100%

2 HDF’s characterization of the soils is incomplete and, in many instances, conflicts with the actual NRCS soil survey data.
of the time, as it fills up before overflowing into the adjacent liquid storage pond. HDF should be required to explain, in detail, how its lagoons were sized to deal with a 25-year, 24-hour precipitation event in addition to average monthly precipitation depths. For instance, in September 1996, there were six days of continuous rainfall, followed by a week of intermittent rainfall, bookended with another seven days of continuous rainfall. If the dairy were approved and constructed, such a significant rainfall event could cause the lagoons to fail and almost certainly to overflow, releasing substantial amounts of manure that will eventually flow and run off into surface waters. The EIS should anticipate the environmental and economic impacts of a catastrophic weather event, lagoon breach, or other severe emergency constituting a "worst-case" scenario at the proposed dairy. An extreme storm or earthquake resulting in a major waste discharge or failed lagoon would likely cause irreparable harm to the environment, even if an emergency response is executed. HDF must also address how the expected impacts from climate change will affect precipitation frequency and quantity, including the aforementioned extreme weather events.

HDF must analyze all of these points in its EIS, as well as a careful examination of what problems each manure constituent can create. For instance, excess phosphorus in surface waters can lead to eutrophication; bacterial contaminants such as E. coli and fecal coliform can render surface waters unsuitable for consumption, recreation, and other uses; and nitrogen (in nitrate form) can move into surface waters and, from there, percolate into the underlying aquifer, rendering the groundwater unfit for human use.

B. The Proposed Dairy Would Contaminate Groundwater, Deteriorating the Environment

Similar to surface water contamination, large dairies in the United States have also been found responsible for contamination of groundwater. Groundwater contamination is especially concerning for this project, as the aquifer in the area provides potable drinking water for the County of Kaua'ı Department of Water Supply. In fact, HDF's WMP does not even identify all of the wells in the project area and provides a skewed picture of how far away those wells are; for instance, while HDF claims that one county well (Kolob F) is over a half-mile away, in reality it is only 750 feet from the paddock in which sludge from the settling basin is proposed to be deposited. HDF should be required to undertake an intensive groundwater study to determine the fate and transport of nitrate to the underlying aquifer. Additionally, multiple groundwater monitoring wells should be required to be installed both upgradient and downgradient of the facility to monitor whether the dairy, if approved, is impacting the groundwater. If it is, then the dairy must be required to take remedial action, including possible cessation of operation.

HDF should also be required to evaluate whether it can apply all of the manure generated by its herd on its land at agronomic rates—that is, at the rate in which manure nutrients will be removed by the crop—that will not result in excess nutrients escaping from the property. HDF bills itself as a zero discharge operation but must prove before it starts operation, including any construction activities, that it can live up to that promise. Excess nutrients are likely to be transported deeper into the soil profile with subsequent irrigation, manure application, and precipitation, where they will eventually discharge to groundwater. Along these lines, FOM is very concerned with the estimated nutrient requirements identified by HDF in the WMP. The dairy seems to believe that its grass crop requires in the neighborhood of 750 lbs/ac nitrogen yearly to be sufficiently fertilized. This is an excessively high number, and one that does not appear to be reflected in the literature for Kikuyu grass. If the grass does not use all of the nitrogen supplied by manure applications, then it will lead to contamination of the groundwater.

Additionally, the liner proposed by HDF for its lagoons is inadequate for this area, considering the numerous vital environmental and cultural resources nearby. HDF indicates it will line its lagoons with a 1.5 mm HDPE lining with 5 mm bimix. FOM does not believe that the liner proposed by HDF will sufficiently stop seepage from the lagoons into groundwater given the concerns with the liner welds and potential pinholing from installation and lagoon cleaning. Indeed, after conducting an intensive groundwater monitoring and modeling study, HDF may determine that is simply not feasible to put any type of manure storage lagoon in this area.

Finally, HDF needs to analyze how manure storage and applications will interact with the wetlands on and nearby the project site. It appears that the wetlands are, indeed, much of the project site itself, comprise a large portion of the watershed that feeds the aquifer—an aquifer relied upon for clean, safe drinking water. If manure is not agronomically applied, then excess manure nutrients, including nitrate and phosphorus, will runoff into surface waters and leach through the soil and into groundwater. But even if agronomically applied, some manure constituents will wind up in the aquifer. Nitrate, for instance, will move through the soil almost at the speed of water, such that any excess or residual nitrate after manure is applied is likely to leach deeper into the soil and eventually into the aquifer. Once it moves past a crop's root zones—for Kikuyu grass, this is a very shallow area—the excess nitrate will reach groundwater. It is only a matter of time. The concentration of nitrate in the aquifer may be further impacted by HDF's proposal to draw 3 million gallons of water per day from Groves Farm wells; as water is drawn for use in the dairy's daily operations, the concentration of nitrate in the aquifer will increase. An investigation into whether the aquifer can support the proposed use of groundwater for daily operations should be conducted and included in the EIS.

Additionally, the withdrawal of 3 million gallons of water per day from an already-sensitive aquifer presents its own concerns. HDF must analyze whether the significant water drain its proposed dairy will have is sustainable in light of limited supply of fresh water provided by this aquifer.

The host of environmental concerns presented by dairies as large as the one proposed by HDF does not end with water resources. Large dairies generate significant amounts of hazardous airborne contaminants that can impact air quality, such as ammonia, hydrogen sulfide, mercaptans, particulate matter, and airborne pathogens, to name just a few of the more than 20 hazardous air pollutants (HAPs) emitted by animal feeding operations of the size proposed.\(^3\) Ammonia is one of the primary contributors to the degradation of air quality around large dairies. Ammonia is known to cause a variety of health impairments, discussed in greater detail below, which is why it has been designated an extremely hazardous substance by the United States Environmental Protection Agency. Hydrogen sulfide is a similarly designated hazardous substance released by dairies, and can also cause serious health risks, especially for the very young and very old. Recent literature also suggests that dairy-related pathogens have the capability of binding to particulate matter and then moving off-site with wind, where it can cause major health problems in nearby populations. And, of course, nobody enjoys the noxious odors that are created by large dairies. The horrendous smell of HDF's proposed dairy would leave downwind residents gasping for fresh air.

Air contamination from the dairy will also contribute to climate change. Fossil-fuel consumption and emissions by and from dairy-optimized vehicles, and emissions of greenhouse gases (GHGs) such as methane and nitrous oxide that result from the high number of cows and quantities of stored manure will exacerbate the already-urgent problem of the warming of the planet. The EIS should consider the degree of contribution that HDF's proposed dairy would have on GHG levels in the atmosphere and climate change.

Because of these (and potentially other) air quality issues, HDF should conduct an extensive air modeling survey to evaluate the impacts its facility will have on nearby residents and tourists. Each contaminant must be carefully analyzed to determine its potential impacts on residents and the environment.

D. The Proposed Dairy Would Harm Threatened, Endangered, and Culturally Significant Species.

Besides degrading various environmental media – the South Shore's land, air, and water – HDF's dairy will also result in harm to threatened, endangered, and culturally significant species. Pollution from large dairies like that proposed by HDF has been shown to change and degrade habitat and result in the destruction of other species, through both direct (e.g., contaminated water) and indirect (e.g., species die-off as a result of eutrophication) effects.

Kikuyu grass, slated to be the "primary" food source for the dairy cows, is known to be an extremely aggressive crop, and may crowd out other species. It is considered a weed pest in some areas. See, e.g., http://www.ipm.ucdavis.edu/PMG/PESTNOTES/np7458.html. There is a risk that, if not properly managed and contained, the kikuyu grass could spread to neighboring parcels and crowd out native plant species. The EIS should explain how HDF plans to contain this aggressive plant. And although the Kikuyu and Kikuyu-Guinea grasses are slated be the cows' primary food source, the importation of any other crops for food sources present a risk that diseases and other invasive species will be introduced to the island. HDF should analyze the degree of risk posed to native plant and animal species by its proposed use of Kikuyu grass and other feed material.

Further, the entire coastline where discharges from the proposed dairy will enter the ocean is protected critical habitat. This habitat is home to a variety of native Hawaiian species. HDF must present a detailed analysis evaluating how its dairy could potentially impact all of the species that live in this protected corridor. Special attention should be paid to Seabird Research, commonly referred to as "o'au, a type of endemic coast vegetation that is a listed federally endangered species and a State of Hawai'i Species of Greatest Conservation Need. The critical habitat designation along the Māhūʻulepū coastal corridor is meant, at least in part, to provide assurance for the continued existence of this species -- a continuation that is seriously threatened by the presence of a 2,000 dairy farm upstream. Other federally endangered species that require investigation in the EIS include Anas wyvilliana (Hawaiian Duck), Hamata'ulā; Branta sandvicensis (Hawaiian Goose, Nene); Fulica ala (Hawaiian Coot); Gallinula chloropus sandvicensis (Common Moorhen); and Himantopus mexicanus knudseni (Hawaiian Stilt, Ae'o). This list is not meant to be all-inclusive; it is incumbent upon HDF to conduct a thorough analysis of how its dairy could potentially impact all surrounding species, not just those that are federally endangered.

Similarly, animal waste has been shown to cause localized impacts on ocean acidification, and resulting impacts on wildlife of the broadest spectrum. These impacts must be addressed on their own as well as from cumulative impacts from climate change.

Finally, although the dairy cows themselves are not a protected species, a risk to the health of the herd exists due to the number of cows occupying a small area. As discussed above, it is clear that HDF plans to house up to 2,000 dairy cows in relatively short order. The EIS should include a discussion of potential risks to the health of dairy

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\(^3\) EPA has identified at least 168 chemical compounds in manure and in the air around livestock operations. In addition to the 20 HAPs, EPA also identified over 160 Volatile Organic Compounds (VOCs). Emissions From Animal Feeding Operations, Draft, U.S. Environmental Protection Agency, Emission Standard Division, Office of Air Quality Planning and Standards, EPA Contract No. 68-D6-0011, August 15, 2001.
II. HDF’s Proposed Dairy Would Substantially Affect Economic and Social Welfare.

A. The Proposed Dairy Would Significantly Impact Important Cultural and Historic Sites and Resources.

In traditional Hawaiian culture, natural resources and cultural resources are considered one and the same. A spiritual connection exists between people and their surroundings, including the land, water, and sky. Māhā‘ulepú is a traditional Hawaiian ahupua‘a, or socio-economic/geologic/climatic subdivision of land, running from the Ha‘u‘u mountain range to the shoreline on Kaua‘i’s southeast coast. In 2006, the National Parks Service identified certain natural and cultural resources in this area, which hold historical significance for the native Hawaiian population and provide recreational and other enjoyment opportunities for visitors. Those resources include: the undeveloped shoreline corridor from Malae‘ula northeastward through Māhā‘ulepú and Ki‘upu Hā‘i to Nāwiliwili Bay; the Hule‘ia National Wildlife Refuge and historic Alekoko Fishpond along Hule‘ia Stream; and parts of the Ha‘u‘u mountain range overlooking these areas. NPS Study at 1. Hawaiian burials have been found along coastal sand dunes, and historic petroglyphs occur on Māhā‘ulepú beach and on Grove Farm agricultural lands in Māhā‘ulepú Valley. NPS Study at 38.

An industrial dairy like that proposed by HDF has the potential to significantly disrupt and damage the ability of the Hawaiian population to appreciate and enjoy their traditional cultural resources. Damage due to construction and increased industrial development and traffic, air and water pollution, and potential loss of species in these culturally-significant areas could lead to profound spiritual and emotional harm to those who value these areas for their cultural and historical significance. The EIS should investigate the presence of historical and cultural sites in and around the proposed dairy operation and conduct an intensive evaluation of how those sites may be affected; for example, whether and to what extent the ability of individuals to grow or gather traditional plants such as taro would be impaired.


HDF’s industrial-sized dairy may cause additional social impacts to the population at large. Increased noise and traffic during the construction phase and during the dairy’s daily operations will negatively affect quality of life for people living near the dairy and in areas receiving increased dairy-related vehicle traffic. The aesthetic and recreational value of areas in and around Māhā‘ulepú would be diminished by the presence of an industrial dairy, especially from pollution of surface water and coastal waters traditionally used for recreation. The EISP identifies certain traditional activities which take place along the Māhā‘ulepú coast, including hiking, hunting, fishing, and gathering. EISP at 3-3. A comprehensive evaluation of potentially-affected recreational activities would also include bird and animal watching, nature walking, wildlife photography and beachfront activities such as surfing, snorkeling, stand-up paddleboarding, and scuba, among others. For example, when water with elevated levels of nitrate and phosphorus reaches the coastal shoreline it will alter the pH, temperature, and chemical makeup of the existing marine water. In turn, coastal marine plant and animal life will suffer. A loss of wildlife and drastic alteration of the makeup of the marine nearshore ecosystems would diminish the enjoyment of individuals who recreate in the Māhā‘ulepú Valley area and along Kaua‘i’s southern coastline, and may cause some of those individuals to cease those activities altogether. The EIS should consider the effects that HDF’s proposal would have on noise levels and visual and recreational interests in and around the proposed project area.

Finally, the need for employees (both short and long term) to construct and operate the CAFO would have impacts on the regional demographics and related social support services. The EIS should consider the impacts that HDF’s proposed dairy would have on the local population, demographic trends and needs.

C. The Proposed Dairy Would Have Significant Negative Economic Impacts.

HDF’s proposed project would significantly affect the local economy. As the EISP identifies, Māhā‘ulepú is located in the Po‘ipū area, which is one of two major tourist and luxury home destinations on Kaua‘i. EISP at 3-3. Concerns about water and air quality, increased noise, health risks, impacts on native plant and animal species (both in the proposed project area and in the affected coastal areas), discussed elsewhere in these comments, in the Māhā‘ulepú Valley and Po‘ipū area would reduce the desirability of the area as a place to live, work, and visit.

The resident population of Kaua‘i is presently in the range of 63,000-70,000.4 The approximately 2500 people (EISP at 3-3) who reside within the Koloa-Po‘ipū Census tract are likely to see their home and property values diminish significantly if a large dairy is operating just a few miles away; property values elsewhere throughout the Māhā‘ulepú Valley and around Kaua‘i may similarly decline. The EIS should conduct a thorough evaluation of the effects that a 2,000-cow dairy operation will have on land and home values in the area.

4 The EISP notes that the 70,000 figure is “slightly above the total population,” while a 2008 National Parks Service Report on Māhā‘ulepú estimates that the island has about 63,000 residents. NPS Study at 6.
The tourism industry on Kaua‘i will also be greatly affected by the presence of a large dairy. Area resorts, hotels, and independent vacation rentals, as well as the recreational facilities, shops, and restaurants that cater to visiting tourists, are all likely to experience a decline in visitors—and consequently, income—if the desirability of the Po‘ipu area and Mala‘e‘e Valley as a vacation and recreation destination is diminished. The 2008 NPS Study estimated that, at that time, Kaua‘i experienced a daily visitor population of about 21,000 tourists. NPS Study at 6. Those visitors infuse money into the local economy by renting hotel rooms and vacation properties, buying meals and souvenirs, and purchasing recreational experiences, such as a sightseeing tour or surf or paddleboard class. Visitors to Kaua‘i also frequently arrive by boat, with both local and international cruise lines including the port of Nawiliwili, among others, as a sailing destination. Itineraries including ports of call on Kaua‘i would likely lose some of their attractiveness when it becomes known, through sites, smells and other impacts, that an industrial dairy is operating mere miles from one of the island’s major resort areas.

Regardless of the method of travel, some tourists will be reluctant to visit a destination—presently known for being the lush and verdant “Garden Island”—on which a large, industrial dairy operates, and the EIS should thoroughly evaluate the ways in which the HDF project would affect the thriving tourism industry.

D. *The Proposed Dairy Raises Infrastructure Concerns.*

HDF’s proposed dairy will require substantial energy consumption, both during construction and daily operations. The EISP indicates that some electrical power will be generated through the use of rooftop photovoltaic panels, but provides no information on the estimated number of panels or what the expected kilowatt output of those panels will be. The EIS should include a detailed analysis of the proposed dairy’s electricity demands and a realistic estimate of any on-site electricity generation. Because on-site power generation will not be available until the photovoltaic panels are installed and functional—or in the event that HDF determines that on-site power generation will be insufficient to meet the dairy’s demand—an evaluation of impacts on Kaua‘i’s utility resources must be undertaken and included in the EIS.

The EIS also should include a thorough characterization of the site and evaluate whether any historic uses (legal/formally recognized or otherwise) render the site inappropriate for a dairy operation. For example, the EIS should investigate whether and to what extent the site may have been used as a landfill or for waste disposal, and whether any hazardous or solid wastes remain on the property. If HDF determines that solid or hazardous wastes are present, it may reconsider the suitability of this location for milk production.

III. *HDF’s Proposed Dairy Would Substantially Affect Public Health.*

HDF’s proposed project raises multiple public health concerns that must be thoroughly researched and carefully considered. While the examples below are not meant to be an exhaustive list, at minimum, the EIS should include an in-depth investigation of the risks posed to public health by virtue of the proposed dairy’s potential contamination of water and air, and the potential that the dairy will serve as a source of vectors for disease transmission.

A. *Groundwater and Surface Water Contamination Resulting from HDF’s Proposed Dairy Would Threaten Public Health.*

Nitrate found in drinking water sources presents risks to human health. In recognition of these risks, the EPA has established the Maximum Contaminant Level (MCL) of nitrate at 10 mg/L. See http://water.epa.gov/drink/contaminants/basicinformation/nitrate.cfm. Infants, pregnant women, the elderly, and persons with compromised immune systems are particularly vulnerable to harmful health consequences of consuming water with elevated levels of nitrate. Infants below the age of six months who consume water with elevated levels of nitrate may experience shortness of breath and become seriously ill, and if untreated, may die. Id. Maternal exposure to environmental nitrate may increase the risk of pregnancy complications, such as anemia and preclampsia. See, e.g., U.S. Department of Health & Human Services, Agency for Toxic Substances and Disease Registry, “ATSDR Case Studies in Environmental Medicine Nitrate/Nitrite Toxicity,” at 53 (Dec. 3, 2013). Epidemiologic studies of adverse health outcomes and high nitrate levels in drinking water have reported an increased risk of hyperthyroidism from long-term exposure to nitrate levels above the MCL, specifically between 11 mg/L and 61 mg/L. Burichholzer, J. et al. “Impacts of Waste from Concentrated Animal Feeding Operations on Water Quality.” Environ. Health Persp. Vol. 115, No. 2 pp. 308-312 (Feb. 2007).

Further, even nitrate levels below the MCL of 10 mg/L may be cause for concern; nitrate at levels less than 10 mg/L has been associated with insulin-dependent diabetes, and increased risk for adverse reproductive outcomes, including central nervous system malformations and neural tube defects, have been reported for drinking water nitrate levels less than 10 mg/L. Accordingly, some public health experts believe that the MCL for nitrate is set too high to effectively protect human health from known or anticipated adverse health effects. As discussed above, the potential for land-applied and stored manure to result in elevated levels of nitrate in ground water is high. Potential mitigation through the use of reverse osmosis systems or other filtration may ameliorate the risk to a certain degree, but even those systems are not necessarily effective: they must be maintained properly to provide protection to the residents of the home, and there is evidence that high levels of nitrates may not be fully removed by reverse osmosis systems. See, e.g., J. Schoeman, “Nitrate-nitrogen removal with small-scale reverse osmosis, electrodialysis and ion-exchange units in rural areas,” Water SA. Vol. 35 No. 5 (Oct. 2009). Furthermore, reverse osmosis systems deplete natural minerals from water.
that can cause the filtered water to damage existing plumbing systems and strip important micronutrients from the human body.

Industrial dairies like that proposed by HDF also present public health concerns due to the risk of surface water contamination to river and stream ecosystems. Increased amounts of phosphorus and nitrogen in surface waters—resulting from agricultural runoff—may lead to large algal blooms, which cause a variety of illnesses in humans. See, e.g., http://www.cdph.ca.gov/Healthinfo/environmentalhealth/water/pages/bluegreenalgae.aspx. Risks to the public may occur when individuals are recreating in water in which an algal bloom is present, or from drinking water sourced from surface water in which an algal bloom is present. Id. Certain strains of algae, such as blue-green algae, produce neurotoxins, which are highly dangerous to humans and other species. Microorganisms in animal waste, such as E. coli and enterococci, are also frequently present in dairy-derived agricultural runoff to surface waters and pose a threat to human health when ingested. Any veterinary pharmaceuticals or antibiotics used by the dairy will likely wind up in downstream and downstream water sources. These pharmaceuticals and antibiotics, on their own, may pose a health risk to humans and other species, but may also contribute to increased numbers of antibiotic-resistant bacteria, which are of particular concern to humans.

B. Air Contamination Resulting from HDF’s Proposed Dairy Threatens Public Health.

Second, industrial dairies like HDF’s proposed dairy also present multiple air quality concerns. As discussed above, stored manure emits major pollutants, including hydrogen sulfide, ammonia, airborne pathogens, and particulate matter. Exposure to ammonia can irritate the eyes, skin, and respiratory system, causing bronchial swelling or even tracheal/nasopharyngeal burns. The threat posed by exposure to ammonia is not taken lightly; in fact, if a dairy releases more than 150 lbs. of ammonia into the air on a daily basis, then it is required to report its releases under the federal Emergency Planning and Community-Right-to-Know Act (“EPCRA”), 42 U.S.C. § 11001 et seq. Exposure to hydrogen sulfide causes skin and eye irritation, and exposure in high levels may lead to even more severe health effects such as seizures, coma, and death. Releases of hydrogen sulfide are thus also required under EPCRA.

In addition to harmful air pollutants, the handling and disposal of manure and production of animal feed at industrial dairies creates airborne particles and dust, which may cause or exacerbate respiratory conditions such as asthma and bronchitis. While the airborne particles themselves pose a problem when they lodge in people’s lungs and respiratory tracts, they may also serve as a mechanism for the transfer of airborne pathogens. Employees and individuals who reside near or frequently visit areas near the dairy are especially susceptible to harmful health impacts from chronic exposure to air with high concentrations pollutants and particulate matter.

Harmful air pollution may also result from the carbon emissions generated by HDF’s operational vehicles. The transportation of thousands of gallons of milk (either to other Hawaiian islands or to the contiguous United States) for processing on a regular basis is certain to contribute to an increase in emissions of volatile organic compounds (VOCs) and other toxic pollutants resulting from frequent truck and tanker trips to and from the dairy. In addition to the health risks posed by the inhalation of polluted air, toxic air pollutants can be deposited onto soil and water, where they may bioaccumulate in plants or animals that are later consumed by humans as food.

C. HDF’s Proposed Dairy Threatens Public Health Because it Increases the Risk of Disease Transmission.

Third, HDF’s proposed dairy poses a public health risk as a means of disease transmission. The dense concentration of livestock would result in proliferating populations of rats, mosquitoes, flies, and other pests. A surge in rodent and insect populations presents at least two major problems: first, swarming and biting flies and insects create a nuisance for swimmers, beachgoers, and other residents and tourists who wish to spend time in outdoor areas. Second, and more troubling, rats, flies, and mosquitoes are vectors for disease transmission, and an increase in the populations of these animals increases the risk of transmission to humans. For example, the bacteria leptospirosis, already a recognized problem in freshwater streams and rivers on Kaua’i, is transmitted in the urine of infected animals; rodents and livestock are typical vectors. http://health.hawaii.gov/about/files/2013/06/leptobrochure.pdf. The livestock crowding at HDF’s dairy, combined with the siting of the industrial dairy in a location with freshwater streams present increases the risk of transmission of leptospirosis and other diseases.

The potential public health threats identified above are just some examples of the types of public health risks that should be thoroughly discussed in the EIS and seriously considered by the approving agencies. To the extent that state waste management guidelines or other state laws or regulations require a plan for pest management, HDF should complete such a plan and include it in its EIS.

CONCLUSION

After HDF has an opportunity to take a hard look at all of the negative consequences of its proposed dairy, FOM believes it should abandon this ill-advised project. Kaua’i in general, and the Māhā‘ule‘pua Valley in particular, are extremely poor locations for intensive, industrial dairy farming. These lands should be preserved and protected, not irretrievably harmed.
From: Irene Sherman <kauaigirl@bluehost.com>
Sent: Monday, February 02, 2015 10:54 AM
To: EPO
Subject: EIS for HDF - Mahaulepu

To Whom It May Concern:

My husband and I are full time residents of Poipu, Kauai. We are also members of Friends of Mahaulepu and are appalled at the "blindness" of the people who are charged with protecting our environment. To date all of the scientific evidence indicating that Mahaulepu is the wrong location for this industrial dairy has been totally ignored.

We were happy to read that HDF will have an EIS done, UNTIL WE LEARNED THAT THEY HAVE SELECTED THE SAME FIRM THAT WROTE THEIR ORIGINAL PROPOSAL to conduct the EIS. THIS IS BLATANTLY A CONFLICT OF INTEREST AND SHOULD NOT BE ALLOWED.

We ask the DOH to fulfill its fiduciary duty to the people of Kauai by requiring HDF to have the EIS done by an impartial firm.

Mahalo,

Dr. Irene R. Sherman
Douglas A. Sherman
May 26, 2016

Dr. Irene & Douglas Sherman

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice

TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Dr. Irene & Douglas Sherman:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

GROUP 70 OBJECTIVITY: Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai‘i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai‘i Revised Statutes and the “Environmental Impact Statement Rules” (Chapter 200 of Title 11, Hawai‘i Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State and Federal agency. On numerous past EIS projects, the Hawai‘i Chapter of the American Planning Association has recognized Group 70’s professional work with Chapter awards for excellence in environmental planning. Part of the EIS scope process involves Group 70’s experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai‘i Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhāulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISP), published January 23, 2015, described the proposed pasture-based rotational-grazing system as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero-discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP. This term was used to identify HDF’s intent to utilize a locally-produced feedstock — grass — for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.
The pastures provide a primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially identifying appropriate varieties of grass, and suitable sites to support sufficient "dry matter" grass yields essential to a cow's diet. Additional project-specific trials will be highly unlikely that the storage pond will be full at any time for the committed 2,000-cow dairy, and nearly impossible for the committed 699-cow herd. While the timing and application of nutrients will correspond with plant uptake, soil microbes may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows not inject cows with bovine growth hormone, referred to as rBST or rBGH. Irrigation water runoff management is the practice of managing the amount, rate, and quality of water runoff from a field to prevent erosion and nutrient loss. The timing and application of nutrients will correspond with plant uptake, soil properties, and weather conditions. For more information on nutrient balance management, refer to Section 3.5.3, Draft EIS Appendix C.

The efficient use of water is critical to the success of the dairy. The Mahaulepu Conservation Plan, which addresses water and wetlands management, has been approved by the US Fish and Wildlife Service. The plan addresses the protection of wetlands and water quality, and includes provisions for the use of effluent through the pivot irrigation systems or through gun irrigation. The majority of the irrigation water supply is provided to the farm from Waiau Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The NRCS provides technical guidance on applying agricultural waste depending on the soil and climatic conditions. The water in the Mahaulepu area is referred to as "Mahaulepu water", which is used for irrigation purposes, and may be applied at different rates depending on the vegetable species found on the site. A full report and list of species is provided in EIS Section 4.11 and Appendix B.

The study summarized in the report is ongoing and will continue to be updated as new information becomes available. The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and manure management. The draft EIS is a summary of the information presented in the report, and is intended to provide a comprehensive overview of the project and its potential impacts. The draft EIS is intended to assist in the planning and design of the project, and to inform the public and other stakeholders of the potential environmental and social impacts of the project.
often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila or musaphilia, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-‘ōhi‘a forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1930 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhā‘ulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pads in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōkō-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Aka Kinoiki Road between Kōkō and Po‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animals wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment associated with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $60,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $164,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $260,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.
WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōkua area was built by Napali formation lavas of the Waima‘a volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saproline, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōkua series. The alluvial material is highly weathered lava and is comprised of dark brown to black silt and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient and is expressed in units of feet per day. It is a measure of how easily water will move through the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōkua-Poipi‘u region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (mgd), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Milk rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGd). These demands are a small fraction of the 3 MGd produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōkua well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōkua F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kauai community.

Regional Water Demand: The adjacent, developed Kōkua-Poipi‘u region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kauai will increase county-wide by 17,300 residents by 2030. The South Kauai population is estimated to reach 16,853 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kauai region (the Kōkua - Poipi‘u - Kalaehe districts), water use in 2035 is projected to be 3.24 MGd, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts that the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface...
Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, US. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of streambanks, and animal walkways will be constructed within the 100-foot setback of streambanks. Structural controls to be utilized during construction will include: silt fence installed in key locations; sandbags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sandbags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, of or surface waters in the Māhu‘ulepō Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CBW to conduct a “Sanitary Survey” of the Māhu‘ulepō and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhu‘ulepō Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

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To provide per-potential nutrient inputs from the adjacent Waipio Valley region were calculated to be 38,510 pounds annually or 3.5 times more than the estimate of potential inputs from dairy fields and irrigation water containing diluted nutrients from effluent ponds were adapted to reflect the HDF facilities. 

Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no air quality standards for dairies in Hawaii. The American Freshman Dairy Odor Model (AFDM) was used to model potential odor levels. The estimated concentration for 

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the minor contributions of nutrients from episodic rainfall, anticipated to occur just 10 days annually from dairy operations. The minor contributions of nutrients from episodic rainfall, anticipated to occur just 10 days annually from dairy operations, was modeled as the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m3, well below the State standard of 150 μg/m3. The estimated concentration for PM2.5 is 0.23 μg/m3, well below the Federal standard of 35 μg/m3 (see Draft EIS Section 4.19 and Table 4-19.2).
applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” with the Development of a Agricultural Subdivision. The panelists, in laboratory conditions, cannot smell the odor but 50 percent of the alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Model results were generated for worst-case meteorological conditions (low wind velocity/ mixing). Generally, trades will disperse odor to less than 2,500 feet, or 44 hours per year. The parameters used in the analysis were based on the approved, final EIS graphics of the potential odor isopleths. Based on the above analysis, the model shows that odors may not be detectable beyond the HD site boundaries (just over half a mile), again not reaching recreational or residential areas. Actual odor impacts are likely to be much lower and/or less frequent than above. It is likely that odor detection will not exceed 44% of the HD site boundaries. The model indicates that odor impacts may not be detectable beyond the HD site boundaries.

The essential differences as compared to the proposed action are highlighted in the following statements.

**ALTERNATIVES**

As part of the DEIS, alternatives were evaluated to determine if they could attain the objectives of the action’s purpose and need, and compare environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action, regardless of cost. The alternatives that do not meet the objectives of the proposed action, regardless of cost are not included in the analysis. The alternatives that do not meet the objectives of the proposed action, regardless of cost are not included in the analysis.

Four possible land uses that would not meet the project purpose are discussed. The alternatives that do not meet the objectives of the action, regardless of cost are not included in the analysis.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. These alternatives include: (1) the development of a Conversion Feedlot Dairy (a dairy at an alternative location on Kauai); and (2) milk processing facilities in the HD site. The analysis, therefore, focuses on alternatives that meet the project purpose.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable within 2,500 feet of the HD site boundaries. The parameters used in the analysis were based on the approved, final EIS graphics of the potential odor isopleths. Based on the above analysis, the model shows that odors may not be detectable beyond the HD site boundaries (just over half a mile), again not reaching recreational or residential areas. Actual odor impacts are likely to be much lower and/or less frequent than above. It is likely that odor detection will not exceed 44% of the HD site boundaries. The model indicates that odor impacts may not be detectable beyond the HD site boundaries.
Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai’i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai’i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai’i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua’i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawai’i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
From: Eds Mac <e.sindt@hawaiiantel.net>
Sent: Thursday, February 19, 2015 9:40 PM
To: HDF
Subject: Hawaii Dairy Farms EIS Comment

Please advise exactly why the Mahaulepu site was specifically selected for your dairy.

Was it because of less cost for development? A favorable lease arrangement with Grove farms? Access by trucking companies? A conducive environment for the cows that will produce the milk product? Other considerations?

As there are many, many other sites on island that would accommodate a dairy without the public controversy surrounding Mahaulepu with cultural, environmental and proximity to sensitive visitor concerns, common sense should enter into your selection. You folks could be heroes and welcomed by the community. So why this path? Please comment.

I do think your purpose of creating a sustainable ag endeavor on Kauai is very noble indeed. I just can’t understand why you would want to create such a public uproar as you have with this ill-thought-out plan and location. There are thousands of acres of suitable land available for a dairy.

Please go back to a more common-sense selection and lets all of us Ag folks working together to make this happen.

Ed Sindt
Kauai Roots Farm
808-651-5520

-----BEGIN PGP SIGNED MESSAGE-----

May 26, 2016

Ed Sindt
e.sindt@hawaiiantel.net

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice

Dear Ed Sindt:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**ARCHAEOLOGICAL AND CULTURAL:** The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau,

-----END PGP SIGNED MESSAGE-----
The fifteen historic properties have been assessed for significance by the National Register of Historic Places. Only one of the alternative actions (conventional feedlot alternative) would achieve the objectives of the action's purpose and need, and compares environmental benefits, costs, and risks of each alternative against those of the proposed action. Additionally, the project will be fully enclosed by perimeter fencing along the boundary of the project area. Based on the research and comments received from the community, the project alternatives are found in DEIS Section 6.

ALTERNATIVES:
As a part of the DEIS, alternatives were evaluated with respect to their potential environmental benefits, costs, and risks. Each reasonable alternative against those of the proposed project would be evaluated with respect to the project alternatives are found in DEIS Section 6.

The project will be fully enclosed by perimeter fencing along the boundary of the project area, which will ensure that project activities and any related impacts are contained within the project area. A full description of the project alternatives is available in the Environmental Impact Statement (EIS) of the project. The alternatives analysis includes a comprehensive evaluation of the range of reasonable alternatives that meet the project purpose, including those that might enhance the existing project area, those that could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District, and the State's established Criteria for Assessment of Alternatives (HRS 11-200). The alternatives analysis provides a comprehensive evaluation of the range of reasonable alternatives that meet the project purpose, including those that might enhance the existing project area. The alternatives analysis provides a comprehensive evaluation of the range of reasonable alternatives that meet the project purpose, including those that might enhance the existing project area.
including pasture agronomy/soil science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.

- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

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- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

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- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

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This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Stephen E Smith  
400 E. 3rd Ave., Apartment 1002  
Denver, Colorado 80203  
1575 Pee Road # 422  
Koloa, HI 96756  
stevesmithadr@gmail.com  
720-231-8893

Group 70 International, Inc.  
925 Bethel St, fifth floor  
Honolulu, HI 96813  
Attn: Jeff Overton, Principal Planner  
HDF@group70int.com  
State of Hawaii Department of Health  
Environmental Planning Office  
919 Ala Moana Blvd, Room 312  
Honolulu, HI 96814  
Attention Laura McIntyre, Program Manager  
Laura McIntyre@doh.hawaii.gov

14 February 2015

Re: Proposed Hawaii Dairy Farm (HDF) on Kauai

Dear Mr. Overton and Ms. McIntyre:

I am the owner of Unit 422 in the Poipu Sands condominium project near the proposed location of the HDF and a part time resident there. I am also a board member of the Association of Apartment Owners of Poipu Sands. I believe Poipu Sands is the closest condominium project to the proposed dairy farm. As such, I have followed the debate regarding the proposed dairy farm at Mahaulepu. I might note that late last year, the Board of Directors of Poipu Sands unanimously voted to express our concern with respect to the HDF and to support the lawsuit brought by the owner of our neighbor, the Grand Hyatt Kauai, demanding that a full environmental assessment be done before permits be granted to the HDF.

While I would not pretend to be an expert on environmental matters, I have been extremely concerned with the news that I have read with respect to the possibility that the proposed dairy farm could cause enormous environmental damage to the areas adjacent to it. While I was pleased to hear the news that the HDF had agreed to have an environmental impact statement prepared, I am concerned whether this statement, paid for by HDF and done by a consultant of HDF’s choosing will, in fact, present an objective, unbiased view of the potential environmental impacts of the dairy farm. Having been a Vice President of a Fortune 50 company for over 15 years, during which I had many occasions to deal with consultants hired by my company, my experience is that such consultants almost without exception, produce reports along the lines that their clients desire.

I would strongly urge the Department of Health to very closely scrutinize the environmental impact statement which will be performed by Group 70. Furthermore, I would urge the Health Department to have its own independent, objective environmental statement prepared regarding potential impacts of the HDF. If even a tiny percentage of the concerns expressed about the HDF prove to be true, the HDF could have a catastrophic impact on large sections of Kauai, including the area where my condominium is located. The Department of Health should take all such potential concerns very seriously before considering approval of the HDF operations and if, indeed, any of the expressed concerns have validity, approval of the HDF should be denied. While I believe it may be possible for a scaled down version of the HDF to operate without the hugely detrimental effects which have been identified, given the sensitive nature of the area where it is proposed, it is not at all clear to me that even a scaled down version of the HDF should be permitted.

Obviously, Group 70 and the Department of Health are both fully aware of the potential environmental concerns that have been identified. However, I believe it is important for both the government of the State of Hawaii, and the government of Kauai County, to take into account the potential economic consequences of allowing the HDF to operate. Kauai’s natural beauty is of course, hugely important to the tourist trade and allowing an unspoiled wilderness area to be turned into a source of tons of animal excrement on a daily basis, with no place to dispose of this filth in an environmentally safe manner, would be an extreme mistake. Again, if only a tiny percentage of the postulated harms occur, it would have a devastating impact on the tax base of the Poipu area of the island which, of course, contributes substantially to the tax revenues for Kauai County.

If a mailing list is maintained of those who have expressed their views to Group 70 and the Department of Health, please add me to it.

Sincerely,

Stephen E. Smith
WATER QUALITY: groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

Groundwater: The groundwater system is identified as a shallow unconfined aquifer system within unweathered volcanic material, which is buried beneath thick-weathered lavas of the Waimea volcanic series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

Subject: Hawai‘i Dairy Farms

Dear Stephen E. Smith:

Thank you for your letter concerning the Environmental Impact Statement (EIS) preparation notice for the proposed Hawai‘i Dairy Farms (HDF). HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater surface water analysis for this Draft EIS examined whether there is hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

The following responses are offered to your comments:

GROUP 70 OBJECTIVITY:

Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and potential impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22, and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUP 70 OBJECTIVITY:

On the basis of the technical studies and analysis conducted by the consultants, the groundwater and surface water resources in the area, and the potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and potential impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22, and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

Thank you for your comments.

Sincerely,

[Signature]

Stephen E. Smith
parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōkō F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōkō F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kauaʻi community.

**Regional Water Demand:** The adjacent, developed Kōkō-Poʻipō region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (BREDIT) projects the population of Kauaʻi will increase county-wide by 17,300 residents by 2030. The South Kauaʻi population is estimated to reach 16,855 in 2035, when it is projected to encompass 192 percent of the County population. For the South Kauaʻi region (the Kōkō - Poʻipō - Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed. The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kauaʻi Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makaawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watermends. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopies along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).
Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35 feet from the top of drainageway (totaling 70 feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 695 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year) and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīlaο-Poʻipiʻi region were also calculated. Nitrogen input to the marine environment in the Poʻipiʻi region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipiʻi region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downstream from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiʻōpili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downstream to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kawaʻi community.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawaiʻi’s Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, masons, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kauaʻi and 8 on Oʻahu.
employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua'i.

The HDF project would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai'i Island), approximately 10 percent of Hawai'i's milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua'i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O'ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai'i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua'i, and 2 indirect jobs on O'ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua'i and another 8 indirect jobs on O'ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**ALTERNATIVES:** As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action's purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action's purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental effects, costs, and risks. The Environmental Impact Statement Rules, Hawai'i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua'i; and (3) milk products processing by HDF. The alternative of "No Action" is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai'i, with the capability to produce 10 percent of the State's fresh milk demand thus reducing dependency on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2). grow
local quality grass as a primary feedstock (Objective 3) and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).

- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supplies; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3).
- However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai‘i Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,
GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
From: Eleanor Snyder [mailto:mehitibel@gmail.com]
Sent: Tuesday, February 17, 2015 4:36 PM
To: EPO
Subject: Dairy Farm at Maha`ulepu

Please do not allow this huge latrine to foul this beautiful and sacred site. The milk isn't even intended for island use. We don't need a dairy in this wonderful area. There must be other sites on the island that are more appropriate.

--
Aloha,
Eleanor Snyder
P.O.Box 389
Lawai, HI 96765
808 332 7988

May 26, 2016

Eleanor Snyder
P.O.Box 389
Lawai, HI 96765
mehitibel@gmail.com

Subject: Hawai`i Dairy Farms
Environmental Impact Statement Preparation Notice
Maha`ulepu Road
Kaua`i, Hawai`i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Eleanor Snyder:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai`i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**ALTERNATIVES:** As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action's purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

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costs, and risks. The Environmental Impact Statement Rules, Hawai’i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

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The essential differences as compared to the proposed action are highlighted in the following statements.

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- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.

- Finally, addressing the range of potential environmental impacts (natural, cultural, social, and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

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- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of feed for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

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This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: http://tinyurl.com/OEQCkAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

February 20, 2015

To: Laura McIntyre
State of Hawaii
Department of Health
1256 Punchbowl Street
Honolulu, HI 96813

Group 70 International, Inc.
925 Bethel Street, 3rd Floor
Honolulu, HI 96813

Jeffrey Overton
Hawaii Dairy Farms, LLC
P.O. Box 1600
Koloa, HI 96756

http://tinyurl.com/OEQCkAUAI
Laura.mcintyre@doh.hawaii.gov

From: Norma Docter Sparks
P.O. Box 1107
Koloa, HI 96756
nndotre@yahoo.com

I was born and raised in Koloa, Kauai, Hawaii. My parents bought our property in 1949 and established one of the first adult nursing homes in Hawaii on this property in 1957. For over 30 years, my parents provided this service to many families on Kauai.

When I was growing up in Koloa, I spent a lot of time at Mala‘ulepu and spent many beautiful hours there. At one time, when I was eight years old, I was able to swim in the lagoon and it was a lot of fun. I even made friends with a seal that liked to play with me. My parents and I have a very special place in our hearts for the lagoon and Mala‘ulepu and I worry that the air quality from the dairy will make our home uninhabitable.

The construction and operation of a 2,000 head dairy farm on Kauai’s south shore will cause irreparable environmental, economic, and social harm. This harm far outweighs any of the alleged benefits of a large dairy on Kauai, especially since the milk produced from the herd will need to be shipped off Kauai for processing and bottling.

I ask that the Department of Health use the EIS process to consider fairly and objectively whether the proposed 2,000 head dairy should be approved in light of the environmental, social, economic, and cultural impacts. The EIS should require the following:

1. The Dairy must conduct a comprehensive review of all local, state, and federal regulations that may impose additional requirements. The Dairy did not list the Endangered Species Act or the Mala‘ulepu Project in this report. The EIS should contain the requirements of the Act because there are at least four native bird species that have been identified as endangered.

2. 2,000 animals should be the maximum number that can be housed on the property at any one time. The EIS should specifically detail how the waste will be handled, especially since the Dairy will dump the waste directly on the land that it has secured for grazing.
4. Specific information on the contamination of surface waters and the waters that eventually will discharge into the ocean. Specific information on the Dairy's analysis or explanation for how it will prevent surface water discharges. The Dairy must explain the steps it will take to eliminate discharge if manure-related pollutants are detected. The Dairy must detail how it will meet the requirements of the Clean Water Act for manure-related discharges into surface waters.

5. Specific information on the soils capacity for disposal of manure through irrigation. The Dairy should be required to conduct a detailed soil survey of the site to evaluate whether manure can be applied to its fields in a manner that protects the environment. The Dairy should be required to provide specific information on the soil's high susceptibility to surface water runoff, that is, to detail how they will protect surface water and the ocean when excess water left on a field from manure applications and/or irrigation water applications can transport water and the manure constituents contained in the water.

6. Specific information on how the Dairy will prevent manure-contaminated water from flowing into the low points of ditches and canals and following the topography of the site to flow into the ocean since water naturally flows downhill as is the case of the site of the Dairy.

7. The Dairy should explain in detail how its lagoons will be sized to deal with a 24-year, 24-hour storm in addition to the average monthly rainfall. The Dairy should be required to detail how it anticipates the environmental and economic impacts of a catastrophic weather event, lagoon breach, or other severe emergency that would be the worst-case scenario at the proposed dairy. The Dairy should detail the potential harm to the environment, even if it executed an emergency response.

8. The Dairy should analyze and provide in detail the problems that manure will create for the environment and humans. These include but not limited to excess phosphorus in surface waters that can lead to eutrophication; bacterial contaminants such as E.coli and fecal coliform that can render surface waters unsuitable for consumption, recreation, and other uses; and nitrogen that can move into surface waters, and from there, percolate into the underlying aquifer, rendering the groundwater unfit for human use.

9. The Dairy should be required to undertake an intensive groundwater study to determine the fate and transport of nitrate to the underlying aquifer. The Dairy should be required to install multiple groundwater monitoring wells both upgradient and downgradient of the facility to monitor whether the dairy is impacting the groundwater.

10. The Dairy should be required to prove before it starts that it can apply all of the manure generated by its herd on the land at agronomic rates and that excess nutrients will not escape the property. The Dairy must be required to prove that the Kikuyu grass will use all of the nitrogen supplied by manure application applications and will not contaminate the groundwater.

11. The Dairy should detail an extensive air modeling survey to evaluate the impacts its facility will have on nearby residents and tourists. The survey should analyze each contaminant to determine its potential impacts on residents and the environment. Because our traditional communities from the Polipu and Mahahalupe areas, we are especially concerned of the very well documented noxious odors created by large dairies. The horrendous smell of the Dairy will negatively affect our enjoyment of our property, our home, and the beaches of Polipu and Mahahalupe.

12. The Dairy should detail its impact on the local economy. The Dairy should detail its impact on our home and property values if the large Dairy will be operating just a few miles away. The Dairy should conduct a thorough evaluation of the effects that a large Dairy will have on land and home values in the area. The Dairy should thoroughly evaluate the ways in which the Dairy would affect the thriving tourism industry on Kauai.

13. The Dairy should detail the potential public health threats by the proliferating populations of rates, mosquitoes, biting flies and other pests including creating a nuisance and increasing the risk of transmission of diseases.
The Environmental Impact Statement (EIS) Preparation Notice (EI SPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a "zero-discharge, grass-fed dairy". The term "zero-discharge" under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows' manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term "zero discharge" as it was construed as no nutrients into the system.

The term "grass-fed" was used in the HDF EISPN. This term was used to identify HDF's intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds' diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of "grass-fed". The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of "grass-fed", the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area "footprint" will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd's primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient "dry matter" grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāʻulepū site on Kauaʻi have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the
energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways that aren't paved will be made to be comfortable under hoof. The management practices and pasture model applied by HDF maximize grass as the cows' primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, exercise while they forage.

A botanical, avian, and mammalian surveys were conducted to assess the potential presence of avian and mammalian species currently listed as threatened or endangered by Federal or the State of Hawai’i’s endangered species lists. The survey will include vegetative buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native species occur or could survive if planted, native species will be used in the stabilization.

NRCS provides technical guidance on applying agricultural waste depending on the actual irrigation needs of the farm. The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigation systems.

FLORA AND FAUNA:

Consulting to assess existing plant species. The survey was conducted to assess the potential presence of avian and mammalian species currently listed as threatened or endangered by Federal or the State of Hawai’i’s endangered species lists. The survey included vegetative buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native species occur or could survive if planted, native species will be used in the stabilization.
covered the dairy site area and immediate vicinity. Common birds and terrestrial
musaphilia, the only Kaua‘i species of native Hawaiian fly listed as Endangered or
Threatened. Native Drosophila habitat is located many miles away in the high

Four species of endangered waterbirds were recorded on the site and at the nearby
farm located within the HDF site. Though the area does not provide critical
habitat, seabirds that nest in upland areas of Kauai may overfly the site. The
derived Hawaiian goose, nēnē was also seen on the site. State Division of
Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject
property. It is probable that some nest on or adjacent to the site as this species nests
in the general Kōla area, and the habitat present on parts of the site is suitable for
nēnē nesting.

The principal potential impacts posed to the five endangered species include those
potentially associated with construction activities, and those associated with dairy
farm operations following build-out. Measures will be adopted to avoid potential
seabird and nēnē goose collisions with fences and structures. Potential measures
include lowering construction cranes at night, using conservation fencing to project
specified areas, marking tall structures and fencing with white visibility polytype,
limiting nighttime lighting, and shading any outside lights used at night. Ongoing
mitigation strategies will be implemented for day-to-day preventative measures,
including an Avian Species Protection Plan. Mitigation measures are further
described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis.
While caution will be taken during any potential disturbance or vegetation removal,
there are almost no suitable roost trees within the dairy site, thus it is expected that
the dairy farm will not affect this listed mammalian species.

**PESTS:** A study of invertebrate species and pest insects was conducted by Steven
Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes
the presence or absence of native species or pest species associated with cattle
management in the general Māhā‘ulepū area, as well as the parasites and predators that
control those species. No federally or state listed endangered or threatened
invertebrate species were noted in the survey of the site. A full report and list of
species found on site is provided in ES Section 4.11 and Appendix R.

Flies were identified on the HDF site using manure from neighboring livestock as
bait for invertebrates. The two flies associated with livestock are the stable fly and
the horn fly, the latter known for biting cattle. These flies and the greenbottle fly
are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at
the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests
are common in areas with high pet populations. It is possible these fly species could
inadvertently be brought to the dairy and utilize manure as a food source. HDF will
prevent and control fly population growth through diligent clean up and sanitation
practices regarding any trash and food waste, as well as through efficient manure
composting practices. A full list of site management measures is provided in EIS
Section 4.11. The project location does not provide any habitat for drosophila
muaphilia, the only Kaua‘i species of native Hawaiian fly listed as Endangered or
Threatened. Native Drosophila habitat is located many miles away in the high
elevation koa-‘ōhi‘a forests.

Fly populations at HDF will be minimized through a process known as Integrated
Pest Management (IPM). Essentially IPM disrupts reproduction with appropriate
means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of
invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950
to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web
among species.

An especially important insect to minimize fly breeding habitat in manure is the dung
beetle, which buries manure and incorporates it into the soil. Populations of dung
beetles found on Kaua‘i and those species already in Māhā‘ulepū Valley, will increase
with the increased manure food source, thus increasing and speeding breakdown of
manure. Dung beetles are specialists in the very important natural process of
breaking up and quickly recycling bovine manure pads. The behavioral diversity
among dung beetle species will work together to bury dung pats in one to three
days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōha-Pō‘ipi‘i region, pest fly populations are dependent upon food and
breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the
region on agricultural lands along Alakaiwō Road between Kōla and Pō‘ipi‘i, and it is
likely the livestock-related flies identified at the HDF site occur in this region as
well. Localized controls to reduce pest populations need to address breeding sites in
and amongst the food and animal wastes within the area. These mitigation
measures will make it difficult for flies to breed, and BMPs will be enforced to
address any increase in population, therefore it is expected that the dairy farm will
not significantly affect recreational and resort areas.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i’s Dairy Farms
(HDF) to the existing economy were evaluated in the Draft Environmental Impact
Statement (EIS), including a fiscal impact assessment report completed in April,
2016 by Plush Economics Pacific. Draft EIS Section 4.15 addresses demographic
and economic factors, with the complete report in Appendix I.

The HDF project would create short-term benefits through jobs for local
construction personnel and local material suppliers. Such jobs would include
equipment operators, cement workers to lay foundations, metal workers,
carpenters, plumbers, electricians, rookers, supervisors, painters, etc. Based on State
employment multipliers, indirect employment related to Dairy construction would
be expected to average about 16 jobs on Kaua‘i and 8 on Oahu. Construction
employment would be expected to average about 12 jobs per year during the
development period. Thus direct-plus-indirect employment association with
construction would be expected to average approximately 36 jobs, of which 28
would be on Kaua‘i.
The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,700 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated significance that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD) of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.
The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā'ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā'ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po‘ipu region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa – Po‘ipu – Kalāheo districts), water use in 2035 is projected to be 3,242 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā'ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā'ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā'ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā'ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the north.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed on a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā'ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CBW to conduct a Sanitary Survey of the Māhā'ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā'ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb/).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top...
of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāuleipō will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po’ipū region were also calculated. Nitrogen input to the marine environment in the Po’ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po’ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.
application. No State or Federal regulations for greenhouse gas emissions from farm 
operations or small businesses currently exist.

**DUST**

Dust will be generated as cows move along soft limestone walkways that connect 
the paddocks and lead to and from the milking parlor. Potential fugitive dust 
emission rates were estimated from published literature, where particulate matter 
(PM) is measurable from the “drylots” of confined dairy operations where animals 
walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates 
potential emission resulting from HDF. Cows in the pastoral rotational-grazing 
system will be on pasture 22 hours each day and will spend two hours – in two 
separate milking cycles – moving to and from the barn for the 10- 
to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to 
the size of the non-pasture areas used by cows at HDF. Results were added to the 
background concentration of particulate matter (both PM<sub>10</sub> and PM<sub>2.5</sub>) measured on 
the island of Kaua‘i, and the total concentration was compared to the State ambient 
air quality standards. Only the contemplated herd size of up to 2,000 mature dairy 
cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust 
impact would be negligible. The estimated concentration for PM<sub>10</sub> is 2.01 μg/m<sup>3</sup>, 
well below the State standard of 150 μg/m<sup>3</sup>. The estimated concentration for PM<sub>2.5</sub> 
is 0.23 μg/m<sup>3</sup>, well below the Federal standard of 35 μg/m<sup>3</sup> (see Draft EIS Section 
4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of 
organic matter in manure. No animals or dairy facilities currently exist in the area 
leased by HDF, so air dispersion models were used to determine potential odor 
levels. Local weather data was used in conjunction with the AERMOD modeling 
system, and published rates for manure odors emissions for dairy heifers and 
effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture 
fields, irrigation water containing diluted nutrients from effluent, the effluent 
storage ponds, and the dairy buildings. Odor rates from published research were 
applied. Odor isopleths (a line used to map all points having the same numerical 
value) were created to display the model findings. Odor is described in “odor units” 
at the threshold of perception, which is defined by the point at which 50 percent of 
panelists, in laboratory conditions, cannot smell the odor but 50 percent of the 
panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low 
wind velocity / mixing). Generally, tradewinds will disperse odors to less than 
detectable levels beyond the HDF site; in periods of no wind, odor may not be 
dispersed creating the “worst case” scenario. In these periods without normal 
tradewind flow, the odor plume would extend to the south of the HDF site. Sections 
4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may 
be detectable by 50 percent of the sensitive population once per 200 hours, or 44 
hours per year, within an area that extends approximately 1,670-feet (within one-
third of a mile) beyond the dairy farm boundary, and does not reach recreational or 
residential areas. Results for the contemplated expanded herd size of up to 2,000 
mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF 
boundary (just over half a mile), again not reaching recreational or residential areas, 
and again with detection limited to 50 percent of the sensitive population 
approximately 44 hours per year. The parameters used in the analysis were 
tentionally conservative, and the impacts shown assume an unlikely confluence of 
worst-case meteorological data, irrigation location, and grazing location. Actual 
offsite odor impacts are likely to be much lower and/or less frequent than shown; it 
is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact 
Statement (EIS). The Draft EIS is available on the OEQC website at the following 
URL search "Hawaii Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
February 20, 2015

To: Laura McIntyre
State of Hawaii
Department of Health
1250 Punchbowl Street
Honolulu, HI 96813

Jeff Overton
Hawaii Dairy Farms, LLC
P.O. Box 1690
Koloa, HI 96756

From: Stephen A. Sparker
P.O. Box 1107
Koloa, HI 96750

Subject: Dairy Farming and Water Quality

I have been visiting Koloa, Kauai, Hawaii since 1958. With my wife, who was born and raised in Koloa, I have learned to value Mala'ule'upu Valley.

A couple of years ago, I moved back to Kauai to my wife's childhood home in Koloa, which is within a short distance of the proposed industrial dairy. In addition to the harm to the Valley, I am very concerned about the dairy because most of our traditions that cool our home come from Polpu and Maha'ulepu and I worry that the air quality from a large dairy will make our home unhealthy.

The construction and operation of a 2,000 head dairy farm on Kauai's south shore will cause irreparable environmental, economic, and social harm. This harm far outweighs any of the alleged benefits of a large dairy on Kauai, especially since the milk produced by the herd will need to be shipped off Kauai for processing and bottling.

I ask that the Department of Health use the EIS process to consider fairly and objectively whether the proposed 2,000 head dairy (not 699) dairy should be approved in light of the environmental, social, economic, and cultural impacts. The EIS should require the following:

1. The Dairy must research the various local, state, and federal ordinances, statutes and regulations that may impose additional requirements. The Dairy did not list the Endangered Species Act but must meet the requirements of the Act because there are at least four native bird species that have been identified as endangered.

2. 2,000 animals should be the number that evaluated throughout the EIS process.

3. Specific information on the impact on the environment by the waste of the cows. The EIS should specifically detail how the waste will be handled, especially since the Dairy will dump the waste directly on the land that has been secured for grazing.

4. Specific information on the contamination of surface waters and the waters that eventually will discharge into the ocean. Specific information on the Dairy's analysis or explanation for how it will prevent surface water discharges. The Dairy must explain the steps it will take to eliminate discharge if manure-related pollutants are detected. The Dairy must detail how it will meet the requirements of the Clean Water Act for manure-related discharges into surface waters.

5. Specific information on the soils capacity for disposal of manure through irrigation. The Dairy should be required to conduct a detailed soil survey of the site to evaluate whether manure can be applied to its fields in a manner that protects the environment. The Dairy should be required to provide specific information on the soil's high susceptibility to surface water runoff, that is to detail how they will protect surface water and the ocean when excess water left on a field from manure applications and/or irrigation water applications can transport water and the manure constituents contained in the water.

6. Specific information on how the Dairy will prevent manure-contaminated water from flowing into the low points of the ditches and canals and following the topography of the site to flow into the ocean. Water naturally flows downhill as is the case of the site of the Dairy.

7. The Dairy should explain in detail how its lagoons will be sized to deal with a 24-hour, 24-hour storm in addition to the average monthly rainfall. The Dairy should be required to detail how it anticipates the environmental and economic impacts of a catastrophic weather event, lagoon breach, or other severe emergency that would be the worst-case scenario at the proposed dairy. The Dairy should detail the potential harm to the environment, even if it executed an emergency response.

8. The Dairy should analyze and provide in detail the problems that manure will create for the environment and humans. These include but not limited to excess phosphorus in surface waters that can lead to eutrophication, bacterial contaminants such as E. coli and fecal coliform that can render surface waters unsuitable for consumption, recreation, and other uses; and nitrogen that can move into surface waters, and from there, percolate into the underlying aquifer, rendering the groundwater unfit for human use.

9. The Dairy should be required to undertake an intensive groundwater study to determine the fate and transport of nitrate to the underlying aquifer. The Dairy should be required to install multiple groundwater monitoring wells both upgradient and downgradient of the facility to monitor whether the dairy is impacting the groundwater.

10. The Dairy should be required to prove before it starts that it can apply all of the manure generated by its herd on the land at agronomic rates and that excess nutrients will not escape the property. The Dairy must be required to prove that the Kikayu grass will use all of the nitrogen supplied by manure application applications will not contaminate the groundwater.

11. The Dairy should detail an extensive air monitoring survey to evaluate the impacts its facility will have on nearby residents and tourists. The survey should analyze each contaminant to determine its potential impacts on residents and the environment. Because our tradewinds come from the Polpu and Maha'ulepu areas, we are especially concerned of the very well documented poisonous odors created by large dairies. The horrendous smell of the Dairy will negatively affect our enjoyment of our property, our home, and the beaches of Polpu and Maha'ulepu.

12. The Dairy should detail its impact on the local economy. The Dairy should detail its impact on our home and property values if the large Dairy is operating just a few miles away. The Dairy should conduct a thorough evaluation of the effects that a large Dairy will have on land and home values in the area. The Dairy should thoroughly evaluate the ways in which the Dairy would affect the thriving tourism industry on Kauai.

13. The Dairy should detail the potential public health threats by the proliferating populations of flies, mosquitoes, biting flies and other pests including creating a nuisance and increasing the risk of transmission of diseases. After the Dairy submits a thorough study, I feel certain that the State Department of Health will not approve the establishment of a Dairy on Kauai and in the Maha'ulepu Valley. Kauai and Maha'ulepu are
Dear Stephen A. Sparks:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.
The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published on January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100% of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Mānā/ʻUluʻupō site on Kauaʻi have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob”, mimicking the natural social order of bowies. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage and throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditches, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Wata Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.
Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāʻulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a breeding/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

**FLORA AND FAUNA:** Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs or near the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing plant species. The survey also investigated the presence of plants currently listed as endangered, threatened, or proposed for listing under Federal or the State of Hawai‘i’s endangered species programs, located onsite or within the immediate vicinity of the dairy site. The nature of the land and its present and historical uses for intensive agriculture very much limit the natural botanical resources anticipated to occur on this land. Complete species lists are included in the EIS, and no protected botanical species occur on the project property. The project will include vegetated buffer strips along the drainage ways as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plants occur or could survive if planted, native plants will be used in the stabilization. No long-term impacts to native plant habitats or endangered or threatened plant species will occur as a result of the dairy.

Avian and mammalian surveys were conducted in August 2014 by Rana Biological Consulting, Inc. This survey was conducted to assess the potential presence of avian or mammalian species currently listed as endangered, threatened, or proposed for listing under either Federal or the State endangered species lists. The survey covered the dairy site area and immediate vicinity. Common birds and terrestrial mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhāʻulepū Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kaua‘i may overfly the site. The endangered Hawaiian goose, nēnē was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest or adjacent to the site as this species nests in the general Kōloa area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to project-specific areas, marking tall structures and fencing with white visibility polytape, limiting nighttime lighting, and shading any outdoor lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site, thus it is expected that the dairy farm will not affect this listed mammalian species.

**PESTS:** A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhāʻulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly, flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophilidae.
The HDF project would contribute to diversification of Kaua‘i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $60,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 44 million gallons (36,718,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $80,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

GROUND WATER

The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.
Hydrology: The area’s hydrology is shaped by its geology. The Kōkua area was built by Napali formation lavas of the Wai‘amea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōkua series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōkua-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate that there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāulepū Valley, which is fed by several intermittent streams coming off the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāulepū Road. This ditch, named Waipōlīlī ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.
Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: slit fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The deme canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year) and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kūkīa-Pō‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.
Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipio Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH OWB, dairy neighbors and the local Kauai community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EE sections 419 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄), from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₂.₅ and PM₁₀) measured on the island of Kauai_L and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₂.₅ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₁₀ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be
dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai'i Dairy Farms": http://tinyurl.com/OEQCKAUAJ

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

We are greatly concerned with the impact that your proposed dairy will have on the surrounding environment and communities in Poipu. Your EIS should address these concerns:

1. Waste getting into the ground water and flowing into the ocean.
2. Diseases breeding in the waste (or the cows) and being transmitted to people and animals.
3. Smells from the dairy flowing into residential and resort communities.
4. Proliferation of flies. (We have heard that you may have a plan to bring in wasps to keep down the fly populations. Really! What impact will wasps have on the whole island?)
5. Degradation of air and water quality from operations.
6. Impact on attractiveness of the area for tourism.
8. Impact on housing values.

Steven Stecher
Portia Igarashi
1901 Poipu Rd. #214
Poipu HI
May 26, 2016

Steven Stecher and Portia Igarashi
1901 Poipu Rd. #214
Koloa, HI 96756
ndsparks@yahoo.com

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Steven Stecher and Portia Igarashi:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. HDF operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed not to discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS. The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways.
and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawaii is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā‘ulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as HBST or rBGH.

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā‘ulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean-up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila musaphilia, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-ōhi‘a forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950.

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to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Makaha Valley will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pads in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōloa-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ala Kina‘ole Road between Kōloa and Po‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animals wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plachy Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawaii Island), approximately 10 percent of Hawaii’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $164,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow herd.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawaii Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area’s hydrology is shaped by its geology. The Kōloa area was built by Nāpali formation lavas of the Waimea volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa
series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is barried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā'ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā'ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (mgd), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaiʻi Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlors and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā'ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā'ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā'ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydroplogic units for managing surface water resources. The project area is located within the Māhā'ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā'ulepū watershed. The HDF site is located on the bottom-land of the upper Māhā'ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā'ulepū Road. This ditch, named Waiopālā Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and
prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makaawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CBW to conduct a “Sanitary Survey” of the Māhāulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and an area upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāulepū Valley. The deme canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CBW noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDE received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, US, Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fencelines and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels would contribute to the marine environment; however, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōkua-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is estimated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilizer in the region is estimated to be 1,280 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downdrift from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input to the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.
The minor contributions of nutrients from episodic rainfall are anticipated to occur just 10 days annually from dairy operations, which will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment that actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua'i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. ER sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1. Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-
third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://friguard.com/OEQC/KAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

Via Certified Mail, Return Receipt Requested:
February 21, 2015

Laura McIntyre
State of Hawai‘i
Department of Health
1250 Punchbowl Street
Honolulu, HI 96813

Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, HI 96813

Jeff Overton
Hawai‘i Dairy Farms, LLC
PO Box 1690
Koloa, HI 96756-1690

Also via e-mail to: HDF@Group70int.com

Re: COMMENTS ON HAWAI‘I DAIRY FARM’S ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE, DATED JANUARY, 2015.

Dear Ms. McIntyre:

My wife, Wendy, and I have had a 37 year love affair with Māhi‘ulepu and Kaua‘i. By way of background, we first came to Kaua‘i in 1978 on our honeymoon and were immediately enchanted by the Island.

In 1991, which was as soon as we could afford to do so, we purchased our home in the Lanai Villas subdivision of the Poipu Kai development. Our home is the last house on the eastern side of the Poipu Kai development (the side closest to the Grand Hyatt) and, therefore, one of the first single family residential homes that will be impacted if there are any airborne contaminants from the proposed dairy farm.

When we first bought our house my wife and I had two small children and maintained our primary residence in Los Angeles. However, virtually every school vacation we would spend on Kaua‘i. Once on Kaua‘i there would be at least a weekly run, hike or bicycle excursion with our
children to Māhā‘ulepu. My wife and I are now full-time residents on Kauai and still frequently hike or bike to Māhā‘ulepu. Any time we have mainland guests a trip to Māhā‘ulepu is always on the itinerary. And, even though my sons are now 26 and 28 and no longer live with us, the first thing that they want to do when visiting is hike into Māhā‘ulepu.

In addition to enjoying the pristine beauty of Māhā‘ulepu my wife are also investors in the Poipu real estate market. In addition to our home we own three lots in the Poipu Beach Estates subdivision. Our intention was to start construction on at least one of our lots this year. However, as explained below, because of our deep concern over the potential negative environmental effects from the proposed dairy farm we will be rethinking from actually starting construction on our lots until we know what will be happening with the proposed dairy project.

By profession I am an attorney licensed to practice in Hawaii, Washington, and California. For the last 37 years my practice has focused on real estate development and litigation. As a result of my practice I have extensive experience in reading expert reports and the factors that go into appraising real property. Based upon my review of the Hawaii Dairy Farm’s draft EIS, information available on the internet and reports and information provided by Friends of Māhā‘ulepu my wife and I have serious concerns about Hawaii Dairy Farm’s draft EIS and in particular its conclusion that “effects to the environment are expected to be minimal.”

While I believe that the proposed dairy farm will have a significant impact with respect to all 13 significant criteria considered by your department, our comments will focus on criteria 4 (substantially affects the economic or social welfare of the community or State); criteria 5 (substantially affects public health) and criteria 11 (detrimentally affects air or water quality).

**The Proposed Dairy Farm Will Decrease Public Well Being, Pollute Surrounding Air and Water, and Have a Negative Impact on Tourism and Employment in Poipu**

Without having to get overly technical it is a known fact that dairy cows and their excrement smell terrible. There used to be a dairy operation just off Kuhio Highway that you would pass when driving between Kapaa and Princeville. Whenever we made that drive when approaching the dairy we would have to roll up the car windows and essentially hold our breath until we passed the dairy. The thought of having to live with that smell on a daily basis is truly frightening.

My understanding is that the proposed dairy operation in Māhā‘ulepu will be considerably larger than the old dairy. Even though Hawaii Dairy Farms claims it can operate it without preducing noxious smells, given the fact that 2,000 dairy cows will produce more waste than 300,000 people it is a virtual certainty that the smell emanating from the dairy farm will be horrible and that at the very least it will prevent people from hiking, biking and swimming in Māhā‘ulepu.

Moreover, given the prevailing trade winds, my wife and I are concerned that the noxious smell from the dairy operation will negatively impact the Poipu Bay golf course, the Haytt and even our home. Putting aside the direct impact on our home, any negative impact on the Haytt’s operations resulting from the dairy operations will have a devastating impact on property values in Poipu.

By way of example, several years ago there was an article in the Wall Street Journal commenting on how much of nuisance wild roosters were on Kauai. After the article came out we had a number of people ask us about the article and whether they roosters would be a problem where they were staying and if they should cancel their trip or at least change where they were staying. An article is the media that golfers or guests at the Haytt were impacted by noxious smells from the dairy would be devastating to tourism and property values in Poipu. With a drop in tourism, local people who depend on major employers in the area like the Haytt, may quickly become unemployed, and unable to provide for their families.

As to our technical concerns with the dairy, it is well documented in the scientific community that diseases including: *anthrax, brucellosis, cryptosporidiosis, dermatophthilosis, Escherichia coli, giardiasis, leptospirosis, listeriosis, pseudowyes, Q fever, rabies, ringworm, salmonellosis, tuberculosis, and vesicular stomatitis* can be transmitted from cattle to humans via “air (aerosol), by direct contact, by contact with an inanimate object that harbors the disease (fomite transmission), by oral ingestion, and by insect transmission.” See Felzer and Currin, *Zoonotic Diseases of Cattle* [http://friendsofmahalepu.org/wp-content/uploads/2014/09/Zoonotic-Diseases-of-Cattle-Virginia-Tech.pdf] Hawaii Dairy Farms does not even address the increased risk of disease from cattle in its draft EIS. Beach goers and hikers would be in the surrounding area and would potentially be affected by new diseases from over 2,000 cattle.

Additionally, in California, a study found that cows were a major source of nitrate pollution in more than 100,000 square miles of polluted groundwater. http://www.nrdc.org/water/pollution/farms.asp Pollution from agricultural runoff into water sources during heavy rains already contributes to water pollution in Kauai, and is bound to be a significant problem at the dairy farm. See [http://thegardenisland.com/lifestyles/health-med-fit/kauai-ocean-safety-report/article_e5b9959a-9b71-11e3-8e68-001e0bc887b7.html](http://thegardenisland.com/lifestyles/health-med-fit/kauai-ocean-safety-report/article_e5b9959a-9b71-11e3-8e68-001e0bc887b7.html)

Significantly, Hawaii Dairy Farms provides no analysis of how contaminated water will impact the the Māhā‘ulepu coastline. Nor does Hawaii Dairy Farms deal adequately in their EIS with the evidence that the topography and geology of the proposed site increases the risks of environmental damage to the coast and our drinking water.

**The Proposed Dairy Farm Will Negatively Impact Property Values**

Uniform Standards of Professional Appraisal Practice (“USPAP”) are essentially the standards applicable for real property appraisal analysis and reports in the United States. In addition to the standards there are USPAP Advisory Opinions which provide guidance to appraisers in how to deal with specific appraisal issues. USPAP Advisory Opinion 9 advises appraisers as to how to value property impacted by environmental contamination. Advisory Opinion 9 recognizes that in valuing real property impacted by environmental contamination the appraiser, among other things, should consider what is known as stigma damage. Stigma damages are basically any negative impact on the marketability of property.

The existence of the dairy will negatively impact the marketability of property in the Poipu area. A knowledgeable buyer is going to research the area and undoubtedly conclude that absent a significant discount in price it is not worth the risk of buying in Poipu when there
May 26, 2016

Jerry and Wendy Stein
1646 Kelaukia Street
Koloa, Kauai 96756
jstein6678@me.com

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Mīhū‘ōlepō Road
Kaua‘i, Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-003: 001 portion

Dear Jerry and Wendy Stein:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, metalworkers, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would

Respectfully,

Jerry Stein

Jerry Stein
1646 Kelaukia St.
Koloa, HI, 96756

Wendy Stein

Wendy Stein
1646 Kelaukia St.
Koloa, HI, 96756
be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment associated with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waima‘a volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepu Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blaneting the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of centimeters per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepu Valley and the HDF site ranges from 10-5 to 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepu may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking...
parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd site of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa-Po‘ipū-Kālāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface

Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococci to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococci in Waiopili Ditch concerns about the proposed dairy prompted CBW to conduct a ”Sanitary Survey” of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).
Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, US. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35 feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 659 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūle'pū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Pōpūi region were also calculated. Nitrogen input to the marine environment in the Pōpūi region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 14 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pōpūi region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downstream from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipōlī Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors, and the local Kau‘a‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 12.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of...
six criteria pollutants. The State of Hawai'i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emissions sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than 4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kauai, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m3, well below the State standard of 150 μg/m3. The estimated concentration for PM2.5 is 0.23 μg/m3, well below the Federal standard of 35 μg/m3 (see Draft EIS Section 4.19 and Table 4-19.2).

Thank you for your participation in the environmental review process.

Sincerely,

Jeffrey H. Overton, AIA, LEED AP
Principal Planner
Dear Mr. Overton:

We are the owners of a condominium located at 2371 Hoohau Road, Kaua'i, HI part of the Poipu Kai Resort on the southeast shore of Kaua'i. We have owned the property since 1989, and have usually visited the island at least twice a year. When on the island, we spend our mornings at Shipwreck Beach which is very close to the condo. When we are not on the island, the condo is rented through a local rental agency – Suite Paradise – and we pay (and have since 1989) the G&I and T&I on these rentals. So, even though we do not reside there we are major supporters of Kauai and pay the appropriate taxes to the State of Hawaii.

We are writing this letter to let you know of our concerns regarding the proposed dairy farm at Māhāʻulepū. We are very concerned about the approval process which was done very quietly by county leadership – perhaps because they knew there would be concerns. As we are sure you know, it has taken some effort and publicity to get the review that is being led by your office underway, and we welcome your involvement in the review of the proposal and the opportunity to express our concerns.

First – We are concerned about run-off into the ocean and the impact on sea life around Shipwreck Beach and the Māhāʻulepū coastline. The proposed location of the dairy is in an area of heavy clay, so rainwater will not be absorbed and will run into the sea with substantial contamination. This will pollute the ocean and change the nature of the fragile Hawaiian environment.

Second – We are concerned about smells and bugs associated with the dairy, given the proximity to South Shore resort locations. It will not enhance the visitor experience and will result in poor publicity and rental problems. People want to go to Hawai‘i to have fresh air, not farm air. We can remember the time when there was a dairy on the northeast shore of Kaua‘i, nowhere near a visitor location. We always had to hold our breath while driving past the pastures. We worry that the same thing will happen with this farm and that the proximity and trade winds will result in providing an unpleasant experience for ourselves and our guests.

Third – We are concerned that the milk will not stay on the island of Kaua‘i, but will be shipped to Oahu for processing and distribution. So any positive result will not benefit Kaua‘i. I would rather have mainland milk than milk that was shipped twice – unpurposed to Oahu, then processed then possibly returned to Kaua‘i.

Fourth – We do not see a solution that will resolve these concerns. While the dairy owners say they will carefully watch for problems, we believe this project – which was approved without any community interaction – should not move forward given the environmental concerns and after the groundswell of disapproval by residents in the area of the proposed dairy farm, once knowledge of the proposal became widespread around the island of Kaua‘i.

So overall, we do not see any major benefits to the proposal and see many concerns. We are sure that your study will highlight these concerns and that following this review, the proposal will be rejected. Your efforts are greatly appreciated.

Sincerely yours,

James and Susan Steinhegan
Owners – Manuloa at Poipu Kai Unit 1001

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May 26, 2016

James & Susan Steinhegan
1633 Hamlet Drive
Troy, MI 48084

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhāʻulepū Road
Kaua‘i, Hawai‘i

Dear James & Susan Steinhegan:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhāʻulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.
energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows' primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow's diet. Additional project-specific trials at the Māhāʻulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob”s, mimicking the natural social order of bovines. Cows spend 22 hours each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows' primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected to last at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy
start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā‘ulepū site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā‘ulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stabby fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila melanohalina, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-‘ōhi‘a forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhā‘ulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pads in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kō‘a-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ahu Kinokii Road between Kō‘a and Po‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized control to reduce pest populations need to address breeding sites in and amongst the food and animal waste areas within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kō‘a area was built by Napali formation lavas of the Waimoa volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 600 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with a quiet aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents...
the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water**: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 94,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well within the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring**: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand**: The adjacent, developed Kōloa-Poipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (Re Kōloa - Poipū - Kalaeo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hu‘upu‘u Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waioipi‘i Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction**: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment log around drain inlets.

**Surface Water Quality**: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waioipi‘i Ditch near the bridge accessing Makawehi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality
assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for other nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and area upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cowb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of ditches to prevent cattle from crossing the ditches. Water from the ditch will be captured and flow into a drainage way. Another setback of 100 feet downstream of the fence will protect ditches from overwashing. Vegetated buffers will be established between the fences and drainage ways to create filter strips that could capture particulates during stormwater runoff events. The practice is limited to drainage ditches within 50 feet of the ditch, and away from life sustaining or recreational areas. The buffer and pasture grass will maintain a vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: Chemical fertilizers from manure deposited directly to pasture and effluent collected from the milking parlor are insufficient to meet the agronomic need of the pasture. The committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 423 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 980 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,516 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downstream of the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline. The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively dispenses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.
Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours—in two separate milking cycles—moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₃.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₃.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1.670-miles (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
In WA State, it is now required to line all ponds and lagoons with a material to prevent drainage and seepage into the land. Still, there have been leaks in the liners. In Kauai, I worry that the ponds/lagoons will overflow when rainfalls take place. And, holding areas such as ponds/lagoons, often begin to create their own specific sludge; creating unforeseen problems in the future.

4.1 Significance Criteria

#5. Substantially affects public health.

Sunnyside WA, which is located about 20 miles south of Yakima has suffered decades from the large cattle operation occuring there. It is called the Cow Palace. At this time, there are homes without water, because the urine and poop contain an unhealthy amount of nitrates. The families living in this area contend with awful odors, undrinkable water that is unsafe for infants, children and pregnant women to drink, wind blow dust for miles around when it is dry, flies are a nuisance, etc. Up to the present time, the public/citizens were not informed about the contamination of the water, soil testing, etc, because the dairy owners did not feel the public needed to know their business. At this time, there is a lawsuit against the dairy farms in the Sunnyside area. The people feel it is only fair that they be given information re: nitrates in the water supply for just one example. The dairy farmers do not feel it is the business of anyone as to the actual number of dairy cattle they have, waste lagoon information, soil testing, etc. The public has now filed their own suit against the dairies. Residents have been told not to let children or pregnant women drink the water due to the content of nitrates found in the water. In this day and age, it is now expected that those involved in farming do so in a manner that is conducive to the health and well-being of those who live in the vicinity of farmland. Increased population has permitted those who want to live in the country to have their personal concerns heard and they want to live as free of pollutants, herbicides, dust, noise from farm machinery as if they lived in town. No one can blame them. Our world is such that the land mass is becoming dissected into plots that ruin any possibility of farming to take place. This is taking place on Kauai. HDF has the goal of implementing a dairy farm on land that is minimal at best to feed cows. The dairy in Moses makes a special claim for the cows that consists of 25 different varieties of grain. Cows just don’t produce the outflow of milk on grass alone. HDF continues to make the statement that they will have grass-fed cows only. City farmers make similar mistakes. Thankfully, they have jobs that help them with the cost of small farming. HDF has its own financial ability to pay for unseen problems that animals create.

4.1 Significance Criteria

#7. Involves a substantial degradation of environmental quality.

The amount of water used in dairy farming is very significant. The milking shed requires constant cleaning; using significant amounts of water.

The land in Sunnyside, where the Cow Palace is located, is one huge mess from hell! Piles and piles of manure over 10 ft tall are located on land that is as dry and firm enough to hold these piles. Flies gleefully cover the land, piles of poop, the cows themselves. Because flies are a problem and bring about disease, sprays are necessary to eradicate them. Methane is another negative by-product of this dairy.

Dairy cows are not treated in a kindly manner. They are kept pregnant, injected with hormones and other substances that increase milk production; the calves are mainly used for veal; and the male offspring of dairy cows usually find an early death as they only cost the dairy money. They are not seen as cost effective. Another disturbing factor surrounding dairy cows is the loss of the calves. If the calf is male, it is usually put down. Veal is made from calves. The dairy cows who gave birth to their calves are often heard believing their grief at the loss of their calves. This is common. Dairy cows are not living a life of luxury. HDF has shared photos of the land where the cows will be held. It is pastoral and beautiful. What person(s) would want to negatively change this beautiful area of Kauai? I would not be surprised if HDF or some other big business would be willing to put a pipeline across Kauai if they could make money from it. This type of capitalistic behavior is ruining the earth as we have known her. Those individuals involved in this project are naive if they think the idea of bringing a dairy farm to Kauai is to benefit the people. There are other more important projects that would benefit the earth and its inhabitants. If the people of Kauai were treated the way those who were in attendance at the Feb. 19th meeting, they would see clearly what is taking place.

The land in Sunnyside on which the Cow Palace is located, is a mess from hell. Piles of manure are seen in areas in which the soil is dry and firm enough to hold it; flies cover the ground gleeefull in the poop, methane is another by-product that our environment does not need.

Thank you for the time and attention to my letter of concerns. After having lived in the farming industry most of my life, I must share that I understand the frustration of those wanting to simply farm. In this day and age, we must make sure that the foods we eat and other produce are free of nitrates and other unhealthy additives. Our world has changed from small farming practices to large land owning businesses. Large farms seem not to be as concerned about the health practices they need to follow.

They have the financial backing to pay off any fines they may incur with their farming practices. They do things their way and hold their ground (no pun intended) as to their farming practices. It is the large landowner and the financially wealthy individuals who seem to only care about the almighty dollar. I am not saying all landowners or all wealthy people. But enough of these individuals still feel it is their prerogative to do as they want and to hell with the rest. This is not going to work in today’s world. We all must know what we put into our bodies and how we treat our earth. I have to admit feeling sick about the venture that HDF wants to accomplish.

HDF is not in the best interest of the people, the animals or our earth to bring a dairy farm to this Island. I do not pretend to know the reason HDF wants to bring the dairy to Kauai. An Island that is small and already has its own problems with population, traffic, etc. Kauai is a green gem in the huge expanse of blue ocean. It is our responsibility to show it respect. Money making ventures such as dairy farms, large development, etc. need to be stopped. It is time. The Island thanks you.

Mahalo,

Nancy Sterns

I am interested in being a consultated party for the draft EIS.
Soil conservation is a core principle behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soils Resource Report for Island of Kaua‘i, Hawaii.” The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalihi Clay at 32 percent, Ka‘ena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugar cane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth.

The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of soil sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas “drainage” refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential for impacts on waterbodies.
In this way, “poorly drained” soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than “well drained” soils (Yost, 2016). There has been no rainfall event that would exceed the capacity of the effluent leaching to associated waterbodies than “well drained” soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai‘i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

**NATURAL HAZARDS:** The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhā‘ulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai‘i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone. The Kaua‘i and N‘ihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands. Although they occur infrequently, Kaua‘i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhā‘ulepū region during and following the hurricanes that affected Kaua‘i in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhā‘ulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berms with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua‘i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketting the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley...
and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōkua-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvium material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 10,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōkua F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōkua F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.
recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

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**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35 feet from the top of the drainageway (totaling 70 feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 1.62 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Pōpū region were also calculated. Nitrogen input to the marine environment in the Pōpū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pōpū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment:** An assessment of groundwater and surface water interaction with the marine water downstream from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.
Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. Emissions from livestock operations include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST
Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR
Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1.670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: [http://tinyurl.com/OEQC/KAUAI](http://tinyurl.com/OEQC/KAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AKP, LEED AP
Principal Planner
From: Mary Isabella Stone  
To: epo@doh.hawaii.gov  
Cc: HDF  
Subject: Hawai’i Dairy Farms, Maha’ulepu, Kaua’i  
Date: Monday, February 23, 2015 12:44:20 PM

I want to be a consulting party for the draft EIS. My address is: Mary Isabella Stone, 2363 Pu'u Road, #3A, Kalaheo, HI, 96741. email: MSTONE13@hawaii.rr.com

I think making a commitment to change the present use of this site/area as a residential and tourist destination area with its present tax basis to providing a food product of protein derived from animal milk is not sustainable. A growing population of providing this food resource is based on a faulty premise. Asian food cultures, vegan cuisines and increasingly health conscious consumers use less dairy or meet their protein needs.

I also question the long term commitment, the “irreversible commitment” of the HDF to the loss of and destruction of natural and cultural resources as safeguarding the 14 wells that provide drinking water to the residents and visitors of that area, the use for both recreational and as about protein source from fishing in the ocean where natural of man-made disasters are unknown but very consequential can have one time or built up of consequential effects is not seen in the proposed mitigation actions of either the effluent ponds, recycling nutrient efficiency systems, additional fertilizers needed to ensure “grass-fed cows” commitment. Long term ongoing studies need to be started additionally to the area of critical habitat use by flora and fauna. There are many examples where this lack of knowledge and its use had negative consequences for residents of the area. Our small land mass is critically isolated from a wider network of support, every part of a sustainable system requires careful study. Examples come from the Mana Plain of Kekaha and the New Orleans LA cities, hurricane loss of natural areas. Recovery takes time requiring our isolated and small base to fend single control study of negative consequences.

I definitely feel these are significant considerations to say NO to the current proposal of HDF. Their objectives can possibly be met in another area of Kaua’i: The probable loss of an important tax basis in the area, natural resource loss of potable water and a cultural food resource suggests the current plan is misjudged the area needs. I do not support this application at this time for the Hawaii Dairy Farms at Maha’ulepu, Kaua’i.

Mary Isabella (Time 3/23/2015)
May 26, 2016

Mary Isabella Stone  
mstone13@hawaii.rr.com

Subject: Hawai‘i Dairy Farms  
Enviromental Impact Statement Preparation Notice  
Māhā‘ulepū Road  
Kaua‘i, Hawai‘i  
TMK: (4) 2-9-003:001 portion and 006 portion  
(4) 2-9-001:001 portion

Dear Mary Isabella Stone:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**NATURAL HAZARDS**

The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhā‘ulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai‘i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone. The Kaua‘i and Ni‘ihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands.

Although they occur infrequently, Kaua‘i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhā‘ulepū region during and following the hurricanes that affected Kaua‘i in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhā‘ulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua‘i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plauch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix I.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, masons, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. This direct-plus-indirect employment association with...
construction would be expected to average approximately 36 jobs, of which 28 would be on O‘ahu.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

*Hydrology:* The area’s hydrology is shaped by its geology. The Kōloa area was built by Nāpali formation lavas of the Waimea volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.3 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD). Of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane
plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōlā F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,200-foot setback surrounding the Kōlā F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōlā-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the South Kaua‘i will increase county-wide by 17,300 residents by 2035. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōlā - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the Island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data; however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the ditch. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The deme canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations: Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or...
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This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEIC website at the following URL, search “Hawai’i Dairy Farms”, http://tinyurl.com/GNCV3LA. Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, ACP, LEED AP
Principal Planner
Hawai'i Dairy Farms

ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

An Environmental Impact Statement (EIS) is being prepared voluntarily by the Applicant to assess potential environmental impacts and mitigation measures associated with agricultural operations at Hawai'i Dairy Farms (HDF) at Mala'ulepu, Kaua'i.

To assist in preparing the EIS, an Environmental Impact Statement Preparation Notice (EISPON) was recently published. A 30-day public comment period on the EISPON ends February 23, 2015. The purposes of the publication and comment period are two-fold:
1. To allow individuals and groups to request to become a consulted party; and
2. To provide written comment regarding effects of the proposed action.

NOTE: Submitted comments will be published in the Draft EIS

__________________________________________
Comment
Name: Tracy Stone Organization: None
Preferred contact Method
Email: kauaiack@pmail.com Postal Address:
Phone: (Optional)

Comments:

Question: Is the source of water sustainable when 50,000 gal., or essentially 9,500 cubic feet, of water is consumed daily? Is the rainfed on the dry side of Hanapu Ridge really adequate to sustain dairy cows, their cattle water, and irrigation?

Question: Will the daily cattle be the proposed dairy have shade adequately?

Question: Will pesticides be sprayed on pasture?
Dear Rebecca Stone:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhū‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

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May 26, 2016

Rebecca Stone
3710 Kākue Road
Kalaheo, HI 96741
kauaibeck@gmail.com

Subject: Hawai‘i Dairy Farms

Environmental Impact Statement Preparation Notice

Māhū‘ulepū Road
Kaua‘i Hawai‘i
TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Rebecca Stone:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

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Group 70 International • 928 Bethel Street, 5th Floor • Honolulu, HI 96813-4307 • tel. 808.523.5866 • fax. 808.523.5874 • www.group70int.com
The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters.

Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP. This term was used to identify HDFs intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāʻulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture and exercise while they forage.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai’i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy
start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF. The committed herd size of 699 mature dairy cows at the Māhāʻulepū site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that have not given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

CLIMATE: Draft Environmental Impact Statement (EIS) Section 4.1 addresses climate conditions. Climatic conditions affect the growth of forage and the health of dairy cows. Heat stress can reduce the productivity of dairy cows, and suitable climatic conditions were an important consideration in siting the dairy.

The Po‘ipū area is generally known for its mild conditions. The area’s climate is greatly influenced by its inland location and valley topography. Winds in the Po‘ipū area are generally from the east-northeast direction (tradewinds) ranging from 5 to 15 miles per hour. Wind conditions vary depending on season and weather conditions, as occasional storms can generate strong Kona winds from the south, and land breeze circulations can develop during times of weak tradewind conditions. Meteorological data for 2014 was obtained for the project site. The predominant winds from the northeast, and the strongest winds come periodically from the southwest.

Rain gauge data for a rain gauge located near the site off Māhāʻulepū Road was obtained from NOAA National Climatic Data Center. The data reveal that more than a week of consecutive rain is very unusual for Māhāʻulepū Valley. The rainfall events for 30 years were recorded (a total of 10,957 days from 1984 to 2013) and ranked based on days of consecutive rainfall (DAPP) and the corresponding multi-day precipitation total (MDPP). Data records show only five occurrences in the last 30 years with more than a week of consecutive rain. And rainfall exceeded 2.0 or more inches during only four occurrences, with 2.6 and 3.7 inches recorded (EIS Section 4.1). Average rainfall in Māhāʻulepū is just under 50 inches annually.

Changes to solar radiation and the hydrologic cycle large enough to affect climate would be large-scale and long-term. The scale of HDF is not large enough to influence global cycles of solar radiation and the hydrologic cycle. Minimal construction and an increase in ground cover density will not affect climate processes. The 557-acre site is not large enough to have a regional influence on climate.

Annual rainfall, prevailing winds, and solar radiation conditions at the HDF site are well suited to growing dairy pasture grass and conducting pasture-based dairy operations. Neither the committed herd size of 699 mature dairy cows nor the contemplated herd size of up to 2000 mature dairy cows will affect climate conditions over the short-term or long-term. No significant impacts are anticipated, and no mitigation would be required.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plachy Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix I.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to dairy construction would be expected to average about 16 jobs on Kaua‘i and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $164,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 44 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.
Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua'i, and 2 indirect jobs on O'ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua'i and another 8 indirect jobs on O'ahu.

The dairy is expected to generate an additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act
Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST
Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua'i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR
Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopaths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopaths.
Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

**ALTERNATIVES:** As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules Hawaii Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Reseeding the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-

Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000
gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure, and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai‘i Dairy Farms": http://hawaii.com/0EQCKAUAJ

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Don Sullivan
yes_its_don@mac.com

Subject: Hawai’i Dairy Farms Environmental Impact Statement Preparation Notice

Māhāulepū Road
Kaua’i, Hawai’i

Dear Don Sullivan:

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Don Sullivan
May 26, 2016
Page 2 of 14
Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and the host farm in (Hawaii) with a new, local source for pasture-raised calves. Male calves will become part of the beef herd, while healthy dairy cows and calves will be relocated to other farms within the region. The use of antibiotics will be reduced, and milk production will be maximized, minimizing stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high-quality feed, and a reduced need for antibiotics. All male calves under six months of age (young female calves that haven't given birth) will be raised until ready to return to pasture or be used for other purposes.

**Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the surface water and downstream areas, paddock fences are set back 35 feet from the surface water.** Irrigation water is provided to the farm from Waiwa Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is designed using computer software and GIS records to allow for the proper flushing of the irrigation system. The irrigation system is controlled using computer software and GIS records to allow for the proper flushing of the irrigation system.

**The Hawaii Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6 and Chapter 13 – Archaeological and Cultural. A 2009 Cultural Resource Survey (HRS 6-130-3934) and a 2016 Cultural Resource Survey (HRS 6-130-2526) were conducted on the project area.**

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area, and 10 sites occur in the extended survey area. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, the carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

**That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intensive sugar cane cultivation on the valley floor.** Even historic era cultural materials are non-existent in the project area and were not affected by the proposed dairy project.

**The archaeological inventory surveys show that a significant amount of potential significance by the NRCS and the State Sites Program.**

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were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhāʻulepū Ahupuʻa, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heirs, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawaiʻi Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area's hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimaʻa volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 900 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Pōlpu region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational, at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaiʻi Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.985 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōloa F well will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaʻau community.
Regional Water Demand: The adjacent, developed Kōloa-Po'ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po'ipū - Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island's infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waipōpī Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waipōpī Ditch near the bridge accessing Makawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waipōpī Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waipōpī Ditch and concerns about the proposed dairy prompted CWB to conduct a "Sanitary Survey" of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waipōpī Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waipōpī Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator bacteria levels. CWB noted that Waipōpī Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Library" (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, US Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulate matter during stormwater events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in deficit and require commercial supplementation. Grass yields are anticipated to
increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Pōpū‘ī region were also calculated. Nitrogen input to the marine environment in the Pōpū‘ī region is calculated to be 38,510 pounds annually, or 35 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pōpū‘ī region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipōʻī Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from livestock operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the
As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action, regardless of the project purpose and need, and compares environmental benefits, costs, and risks. The environmental benefits, costs, and risks are evaluated by using public input during the project scoping phase or document development. The alternatives that do not meet the general criteria for consideration under the Draft EIS are identified in the document, and public comments are solicited. The alternatives that do not meet the general criteria for consideration under the Draft EIS are identified in the document, and public comments are solicited. The alternatives that do not meet the general criteria for consideration under the Draft EIS are identified in the document, and public comments are solicited.

Rigorous exploration and evaluation of the environmental impacts or avoidance, reduction, and/or minimization of any adverse environmental effects or risks, and impacts are avoided under the project purpose and need. The alternatives analysis provides a comprehensive evaluation of the range of potential uses under the project purpose and need, and impacts are avoided under the project purpose and need. The alternatives analysis provides a comprehensive evaluation of the range of potential uses under the project purpose and need, and impacts are avoided under the project purpose and need. The alternatives analysis provides a comprehensive evaluation of the range of potential uses under the project purpose and need, and impacts are avoided under the project purpose and need.

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produce 10 percent of the State's fresh milk demand thus reducing
dependence on imported milk (Objective 1). This alternative, however, would
not reduce reliance on costly imported fertilizer and feed (Objective 2); grow
local, quality grass as a primary feedstock (Objective 3); and would not utilize
100 percent of manure on site as nutrients to grow forage for dairy cows
(Objective 4).

None of the alternatives would secure a dairy location that meets the
requirements for a pastoral, pasture-based grazing dairy: sufficient
contiguous land area; available long-term land tenure; adequate potable water
supply; suitable soil properties; gentle slope conditions; and accessibility
(Criterion 1).

One alternative (Agricultural Park) could potentially generate new long-term
employment in the agricultural sector on Kaua‘i in a wide range of positions
including pasture agronomy/soils science, environmental resources
management (Criterion 2).

The Agricultural Park alternative could also develop sustainable food
production utilizing Important Agricultural Lands, demonstrating the
importance of long-term agricultural leases and capital investment for
agricultural infrastructure, water systems and support facilities. (Criterion 3).

However, after years of trying, it appears there was limited interest in such a
venture.

Finally, addressing the range of potential environmental impacts (natural,
cultural, social and economic) (Objective 8) the two alternative development
scenarios would generate fewer beneficial impacts and produce impacts that
could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of
Hawai‘i Dairy Farms, was determined to be the most viable option and is the
preferred alternative. Of all the alternatives considered, this is the only approach that
achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy
  operation in Hawai‘i, with the capability to provide more than 1,000,000
gallons of the fresh milk demand, reducing dependence on imported milk
(Objective 1).
- The planned dairy location meets the requirements of minimum land area,
  soil properties, slope conditions, water supply, land tenure and availability,
  and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the
  agricultural sector on Kaua‘i, including pasture agronomy/soils science,
  veterinary and animal husbandry, environmental resources management,
  milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion
  3) will occur with the proposed action, demonstrating the importance of long
term agricultural leases, and the ability to draw capital investment for
agricultural infrastructure including water systems and support facilities
(Criterion 3).

Address the range of potential environmental impacts by utilizing 100
percent of manure as natural fertilizer to grow the majority of food for cows
(Objective 4). The alternatives evaluated would generate fewer beneficial
impacts and produce impacts that could potentially exceed those anticipated
from the proposed project.

Creating an economically viable pasture rotational-grazing model maintains
agriculture, retains open space, and provides buffer between highly utilized
resort and residential development and sensitive natural or cultural resources
(Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact
Statement (EIS). The Draft EIS is available on the OEQC website at the following
URL, search “Hawai‘i Dairy Farms”: [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

[Signature]

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
late are a crystal clear warning of future devastation. Consider that a Koloa drinking water well is just 750 feet (not the one mile HDF claimed) from one of the proposed holding tanks and you have a disaster waiting to happen.

When (not if) we have our next major rain episode, the amount of nitrates and phosphates flowing into our sensitive lands and bodies will have devastating consequences.

Lastly I will touch on Criteria #2, Curtail the range of beneficial uses of the environment; (for plants, animals, or humans). I honestly cannot think of a "beneficial use" activity, plant, animal or human, that will not be adversely affected by the addition of an industrial dairy in that valley. Swimming, snorkeling scuba, paddling fishing (pole, spear and thrownet), bicycling, and hiking are just a partial list of the human uses that will suffer greatly if this ill-designed project happens. Regarding "beneficial uses" by plant, animal and human communities, this is the worst idea I've heard proposed in all my years on this island.

All of these activities, of course, are engaged in by tens of thousands of South Shore visitors, these visitors providing millions of dollars in taxable revenue. We quite simply cannot afford to risk losing significant percentages of that revenue for a project which we provide precious few long-term jobs and which will be sending all of its product off-island to be sold who-knows-where.

And have I mentioned the flies? Tens or hundreds of thousands of swarming, biting flies sweeping throughout the South Shore resort district. The editors of Conde Nast travel guides are going to love having that. Please, do not let that happen. The keiki have to be able to visit this sacred area.

Sincerely,

James Sullivan
Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watersheds. The United States Department of Agriculture (USDA)Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 55 percent of the United States. Comments received during the initial scoping for this EIS included a "Custom Soils Resource Report for Island of Kauai, Hawaii." The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalihi Clay at 32 percent, Kaena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyo grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as "poorly drained", and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure slurry. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen, phosphorus, calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas "drainage" refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrate into gaseous forms, which reduces the potential for impacts on waterbodies.
HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai'i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua'i, and 2 indirect jobs on O'ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua'i and another 8 indirect jobs on O'ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area's hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths—as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepu Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.
The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day.

Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawaiʻi Department of Health Milk Rules require that potable water be used for milk production, both in the milking process and for milk operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kauaʻi community.

Regional Water Demand: The adjacent, developed Kōloa-Poipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kauaʻi will increase county-wide by 17,500 residents by 2030. The South Kauaʻi population is estimated to reach 16,855 in 2030, when it is projected to encompass 19.2 percent of the County population. For the South Kauaʻi region (the Kōloa-Poipū-Kalaheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed...
in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment bags around drain inlets.

Surface Water Quality: The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageway; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge into the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input to the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occur rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment
which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CBW dairy neighbors and the local Kauai community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: search "Hawai'i Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AQP, LEED AP
Principal Planner
Mahaulepu Farm and Grove Farm, allow for stability in support of farm ventures, help maintain regional water systems and provide agricultural employment for Kaua‘i residents in addition to fresh, local food.

The project site is on agricultural land in Māhāulepū Valley, an area with a long history of agricultural use as it was the first place in the island chain where sugarcane was commercially grown. The site is in the Agricultural District per State Land Use District designations, and per the County of Kaua‘i zoning ordinance. The site consists of land classified as Prime per the State Department of Agriculture’s Agricultural lands of Importance to the State of Hawai‘i (IALSH). The HDF site is outside of the County-designated Special Management Area under the Coastal Zone Management Program.

In 2011, Mahaulepu Farm LLC filed a petition with the State of Hawai‘i Land Use Commission to designate 1,533 acres of agricultural lands in Māhāulepū (including 557 acres that make up the HDF site) as IAL IAL designation meets the objectives of the State HRS §205-42 by contributing to the maintenance of a strategic agricultural land resource base to support a diversity of agricultural activities and opportunities that expand agricultural income and job opportunities. See Figure 4.4-2 in DEIS Section 4.4.

The following responses are offered to your comments:

**LAND USE:** The historical and existing land uses of the project site and surrounding Māhāulepū Valley were examined in the Draft Environmental Impact Statement (EIS), and uses proposed by the Hawai‘i Dairy Farms (HDF) project were evaluated in the context of county and state land use designations for the area. The evaluation of land use is presented in Draft EIS Chapter 4.4, and the project’s consistency with government plans and policies is presented in Draft EIS Chapter 5.0.

The south shore of Kaua‘i is home to some of the most productive farm land in the state, attributed to consistent sunshine, ample fresh water, and a large amount of Class A and B soils (with “A” representing the class of highest productivity soils and “E” representing the lowest). The large tracts of farmland, including those

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**LAND USE:** The historical and existing land uses of the project site and surrounding Māhāulepū Valley were examined in the Draft Environmental Impact Statement (EIS), and uses proposed by the Hawai‘i Dairy Farms (HDF) project were evaluated in the context of county and state land use designations for the area. The evaluation of land use is presented in Draft EIS Chapter 4.4, and the project’s consistency with government plans and policies is presented in Draft EIS Chapter 5.0.

The south shore of Kaua‘i is home to some of the most productive farm land in the state, attributed to consistent sunshine, ample fresh water, and a large amount of Class A and B soils (with “A” representing the class of highest productivity soils and “E” representing the lowest). The large tracts of farmland, including those
Overall, the project provides long-term benefit and support of agricultural lands and industry through continued use in keeping with zoning and IAL designation. Long-term operation of the dairy does not preclude the region for future protection in a coastal park at Mānāʻalepū.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofer, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

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Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
To whom it may concern,

As a 37 year resident of Kauai I have seen many agricultural endeavors come and go. Some of these operations were “cleaner” than others on the environmental impact they had and left. Currently the water quality going into the ocean from the few animals that graze in Mahaulepu Valley is severely polluted. More animals will mean worse pollution because the soil does not absorb enough of the runoff. I feel that the dairy should be somewhere else on the Island where the runoff water containing the animal feces will not go into the ocean.

Jay Sussman  
3024 Wawae rd  
Kalaheo, HI 96741
Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāulepū Valley, HDF established a 1,000-foot setback surrounding the Kōka P well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

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The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the area, and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction

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Jay Sussman
May 26, 2016
Page 2 of 8

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May 26, 2016
Page 3 of 8
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Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal
area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s use and need, and compares environmental benefits, costs, and risks of each alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
In contrast to the other options considered, the planned agricultural operation of Hawai'i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai'i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai'i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua'i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawai'i Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

Ashley Swanson
1960 Nani Pali Rd
Lihue HI 96766

February 21, 2015

Laura McIntyre
State of Hawaii Dept of Health
1250 Punchbowl Street
Honolulu HI 96813

Group 70 International
925 Bethel Street 38th Floor
Honolulu HI 96813

Jeff Overton
Hawaii Dairy Farms
PO Box 1690
Koloa HI 96756


Dear Ms McIntyre,

I was born on Kaua'i and I have fond memories of days at Malaekahana Beach with my family. You need to know Malaekahana and its hiking trail are very special to many Kaua'i families. Dairy odor and flies will ruin Kaua'i families' hours spent at this beautiful beach and on the ocean side trail.

My mother passed away in 2012 which left our family devastated. Mom worked at the Grand Hyatt Kauai. My dad has worked in guest services at the Grand Hyatt for nineteen years. Dad has asthma. A dairy if located in Malaekahana Valley will be directly upwind of the Grand Hyatt Kauai. The air pollution from a dairy of any size will cause respiratory harm to my dad. We can't afford to lose our surviving parent, emotionally or financially. How many other Hyatt employees will endure respiratory harm because they need their job to pay their mortgage? How many Hyatt guests will never return to Poipu?

The certain air pollution, flies, and economic harm to local Poipu workers caused by an industrial dairy in Malaekahana valley all need to be addressed and answered by the EIS.

Sincerely,

Ashley Swanson

Group 70 International - 925 Bethel Street, 5th Floor - Honolulu, HI 96813-4398 - tel. 808.523.5866 - fax. 808.523.5874 - www.group70int.com
May 26, 2016

Ashley Swanson
1960 Nana Pali Road
Lihue, HI 96766

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Ashley Swanson:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such a time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPBN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with cows’ manure on-site. However, nutrients would be introduced to the HDF site with proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPBN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock—grass—for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed.” The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed,” the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, including storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock—grass—as the herd’s primary food source. Reducing imported feed costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet. Improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestive cycle. The animals are managed in social groups known as “mob s,” mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways...
699 mature dairy cows at the M‡óósite applies to mature dairy cows. The HDF herd are birthing/mature dairy cows. For more information on site hard management refer to Section 3.7 of the Draft EIS. Animals in various stages of lactation and rest will be transferred between HDF and healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks, surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks, irrigation water supply is provided from Waialae Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The very precise application of irrigation water and/or diluted effluent on the pasture. The PESTS: No federally or state listed endangered or threatened invertive species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.1 and Appendix A.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be tested with a high standard of animal identification and management to ensure the herd is free from disease. All records concerning animal health will be maintained to ensure timely treatment of illnesses. Adherence to guidelines that prohibit milk from cows prescribed use of antibiotics approved by the Food & Drug Administration (FDA) will be required. Laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with hormones, referred to as BST or rBST. The 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It is contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy, will be built to accommodate 30 days of storage for up to 20% more dairy cows, and over 65 days for feed and 60 days for water. Irrigation water will be used to supplement agricultural water, and applied every 4 days, and the slurry application is expected at least once a week. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance practices regarding any trash and food waste, as well as through efficient manure management refer to Section 3.7 of the Draft EIS. The project location does not provide any habitat for endangered or threatened native Drosophila species. The only known species of native Hawaiian fly used as endangered or threatened. Native Drosophila habitat is located many miles away in the high hi'a forests.

Flies were identified on the HDF site using manure from neighboring livestock as a food source. However, this food source is not desired use of the waste. Reported in the title of the livestock waste guidance for the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through both biological and sanitation practices. The fall mating of cattle may be used to reduce livestock-related insect. BPM utilizes fences, and fences are designed to provide a comfortable path under hoof. The cow races are designed to provide a comfortable path under hoof. The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks, surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks, irrigation water supply is provided from Waialae Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The very precise application of irrigation water and/or diluted effluent on the pasture. The PESTS: No federally or state listed endangered or threatened invertive species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.1 and Appendix A.

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An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhā‘ulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pads in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōloa-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Aha Kinoiki Road between Kōloa and Po‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animals wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 20 would be on Kaua‘i. The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu. The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric
fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

**DUST**

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylot” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”:

http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
February 23, 2015

Laura McIntyre
State of Hawaii Dept of Health
1250 Punchbowl Street
Honolulu HI 96813

Group 70 International
925 Bethel Street 36th Floor
Honolulu HI 96813

Jeff Overton
Hawaii Dairy Farms
PO Box 1690
Koloa HI 96756


Dear Ms McIntyre,

I am a 55 year old widower with three children and three grandchildren born on Kauai. My family has been swimming and surfing at Gillin Beach and Mahaaulepu for 30 years. I have worked as a bellman at the Grand Hyatt Kauai for 19 years. The Hyatt is directly downwind of the proposed dairy. My son, my grandson and I suffer from asthma.

I’ve read about the air quality problems associated with dairy farms on the EPA’s website. The air quality problems are caused by gases emitted from the decomposition of animal wastes and by the dust generated by animal activity and farming practices. These air pollutants can cause respiratory illness, lung inflammation and increase vulnerability to respiratory diseases like asthma.

Should my health and well being be affected by production of raw milk for shipment to Honolulu by a for-profit dairy development company called Hawaii Dairy Farms?

Will I have to quit my job to save my life because an air polluting dairy development is permitted to operate upwind of my workplace? Will I get laid off because guests stop staying at the beautiful Hyatt because of the dairy’s air pollution?

The certain air pollution and economic harm to Poipu visitor industry workers caused by an industrial dairy in Mahaaulepu Valley need to be addressed and answered by the EIS. Specifically, a study must determine the distance aerosolized manure and urine will travel with Kauai trade winds when effluent is spread through overhead irrigation.

Aloha,

William Swanson

May 26, 2016

William Swanson
4413 Panui Street
Kalaheo, HI 96741

Subject: Hawaii’s Dairy Farms Environmental Impact Statement Preparation Notice

Mihāʻulepā Road
Kaua’i, Hawai’i

TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear William Swanson:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawaii. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawaii’s Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plash Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, masons, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would
be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂·₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂·₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).
ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF; so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity/mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OGEF website at the following URL: http://tinyurl.com/OGEFKAUJ

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Mark,
Sorry, this was dated 2/19/15, but I didn’t see it till now. Forwarding for your attention.

Laura, FYI - this was addressed to the Environmental Council, so I don’t think you have to respond to it.

Thanks,
Linda Hijirida

-----Original Message-----
From: Cynthia Talaber [mailto:ceejtal@gmail.com]
Sent: Thu 2/19/2015 7:22 AM
To: environmental.council
Cc: Dave Talaber
Subject: KEEP HDF OUT OF MAHAULEPU

Members of the Environmental Council:
Not enough time was given to allow me to mail this, so this email counts as a mail-in.

Please do not allow Hawaii Dairy Farms to ruin our Mahaulepu. Haven't you considered the economic disaster that will happen? All because a billionaire needs a tax writeoff?

When HDF plans to create a large “zero discharge” dairy for the first time in Hawaii, why locate an experiment like this in a beautiful, treasured place, which has deep roots in Hawaiian culture, and has a fragile environment and ecosystem? Why does HDF insist on calling its dairy “grass fed” when their management plan calls for supplementing each cow’s feed with at least 26 pounds of grain daily (HDF plan, page 90)?

Why did HDF exclude the results of the “Custom Soil Resource Study” done by the Natural Resource Conservation Service when it filed its current Waste Management Plan with the state on July 23, 2014? The study, released June 5, 2014, focused on the proposed dairy site and concluded that HDF’s plan for a land application of the cow waste would be problematic at Mahaulepu, as more than 50 percent of the proposed farm soil is at high or very high risk of runoff due to its high clay content. Instead, HDF has never retracted their printed claim of “NRCS permit-completed.” As anyone can verify, the NRCS does not issue permits for any operation in Hawaii.

HDF states that it “independently modified” the design of the effluent ponds after having “received additional rainfall data” and as a result of a “collaborative effort with community members and the DOH,” but he neglects to mention that HDF submitted their initial plan for the ponds without adequate soil analysis and without accurate storm event and rainfall readings. Why didn’t HDF check with Grove Farm (their landlord), who has recorded and reported to the state all rainfall readings from the Mahaulupei rain gauge for the past 50 years? Grove Farm sends its readings to the state hydrologist and National Oceanic and Atmospheric Administration, from whom Datta claims HDF eventually got their information. With a simple phone call to NOAA, FOM obtained rainfall/storm event records the same day. Those records were then shared with Sina Pruder at DOH. Subsequently, Ms. Pruder informed FOM that HDF had been asked to increase the size of their effluent ponds. In the event of a storm or extended rainfall event (remember 30-plus days in 2006?), a serious risk of overflow/discharge exists with ponds already full of effluent and manure residue.

Speaking of being informed, as early as 2003 the American Public Health Association called for a nationwide moratorium on large animal operations such as the dairy proposed for Mahaulepu - citing overwhelming scientific evidence of public health concerns. Their call was repeated by the Canadian Medical Association, the Michigan State Medical Society and numerous local boards of health across the land.

Kauai has a cherished history of small, sustainable businesses. It should be no different with agiculture. Sustainable, environmentally sound, akamai - these are the hallmarks to which we aspire, whether it be in energy, tourism, development or ag. FOM members have donated their time, training and expertise to study HDF’s proposal and looks forward to a complete and honest evaluation of Mahaulepu as a suitable location for the proposed industrial dairy.

We are simply asking that a much smaller sustainable dairy be located elsewhere on land that cannot be easily contaminated, is not culturally significant, is away from drinking water, population centers, our vibrant visitor industry, and won’t damage the beauty and tranquility of our local landscape.

Cynthia and Dave Talaber
1871 Pee Rd
Koloa, HI 96756
Dear Cynthia & Dave Talaber:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

Your comments were received by the State of Hawaiʻi Department of Health Environmental Planning office. The Department of Health forwarded a copy of your comments to Group 70 International in order to be included in the Draft Environmental Impact Statement (EIS) analysis. This letter was prepared in response to your comments.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawaiʻi. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawaiʻi Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhāʻulepū Valley on the island of Kauaʻi to produce fresh, locally available nutritious milk for Hawaiʻi families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Bond Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāʻulepū site on Kauaʻi have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups.
known as “mob”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the source, methods of the waste, reflected in the title of the livestock waste guidance. Hawaii is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Livestock Waste Application Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā’ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā’ulepū site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd. heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as BST or rBGH.

SOILS: Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during dryer periods, to filter and buffer potential pollutants from leaching fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawai‘i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua‘i Soil & Water Conservation District in December, 2013.
The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a "Custom Soil Resource Report for Island of Kau‘i, Hawai‘i." The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Ka‘íhi Clay at 32 percent, K‘a‘en‘a Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as "poorly drained", and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen phosphorus calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas "drainage" refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential for impacts on waterbodies. In this way, "poorly drained" soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than "well drained" soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai‘i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing season. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

ARCHAEOLOGICAL AND CULTURAL:

The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic era cultural materials associated with many Land Commission Awards in the project area were nonexistent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the six sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burial, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhāulepū Ahupua‘a, has been and is
Currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, and petroglyph boulders, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the project area. Based on the research and comments received during the development period. Thus direct-plus-indirect employment associated with Dairy construction would be approximately 50 direct jobs, with approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cows.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, and many others. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and nearly 10 indirect jobs. The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State of Hawai‘i (both on the Big Island), approximately 10 percent of Hawai‘i’s milk is locally produced. This would double local milk production currently supplied by operational dairy farms in the State, and would be on Kaua‘i.

The HDF project would generate a net income of approximately $55,000 to the County of Kaua‘i. The Kilauea area was built by Kilauea formation lava of the Waimea volcanic series. Surface lavas of the Kilauea formation are found on the island of Hawai‘i. The major aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial materialblanketing the valley floor is highly weathered and is composed of dark brown to black clay and clayey silt. The alluvial material within the valley is filled with unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the soil.
ground. The hydraulic conductivity of the alluvium that underlies Māhā'ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po'ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā'ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanics series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further details.

### Potable Water

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā'ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā'ulepū 14 well and the County's Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā'ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

### Groundwater Monitoring

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po'ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalaheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā'ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā'ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā'ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hulūpu‘u Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā'ulepū Road. This ditch, named Waipioi Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

### Potential Impacts from Construction

The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Bulk facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barrier in swales; and geotextile filter fabric and sediment log around drain inlets.

### Surface Water Quality

The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waipioi Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococci to the State Department of Health (DOH) and provided its data, however. DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore
The groundwater and surface water analysis conducted for the Environmental Impact Statement, which provided information on the water quality of the Waiopili Ditch and areas upstream, and initiated a series of investigations to determine the potential nutrient throughput to surface waters. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: "Waiopili Ditch Sanitary Survey, Kauai, Part I." The Sanitary Survey found no significant impact to the ditch from any activity that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interactions with the marine water conducted from the dairy site and the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water and ocean water. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from salt water. In any event, the elevated levels of indicator bacteria down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from salt water. In any event, the elevated levels of indicator bacteria down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch.

Nutrients. Farm Effluent, Irrigation and Commercial Fertilizer. The water quality modeling for the Waiopili Ditch flow modeled the impact of farm effluent and commercial fertilizer. The model indicated that the nutrient concentrations downstream of the dairy operations would be within the state guidelines for water quality. However, the model also indicated that the nutrient concentrations downstream of the dairy operations would be within the state guidelines for water quality. The model also indicated that the nutrient concentrations downstream of the dairy operations would be within the state guidelines for water quality. The model also indicated that the nutrient concentrations downstream of the dairy operations would be within the state guidelines for water quality. The model also indicated that the nutrient concentrations downstream of the dairy operations would be within the state guidelines for water quality. The model also indicated that the nutrient concentrations downstream of the dairy operations would be within the state guidelines for water quality. The model also indicated that the nutrient concentrations downstream of the dairy operations would be within the state guidelines for water quality. The model also indicated that the nutrient concentrations downstream of the dairy operations would be within the state guidelines for water quality. The model also indicated that the nutrient concentrations downstream of the dairy operations would be within the state guidelines for water quality. The model also indicated that the nutrient concentrations downstream of the dairy operations would be within the state guidelines for water quality. The model also indicated that the nutrient concentrations downstream of the dairy operations would be within the state guidelines for water quality.
Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be initiated in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing monitoring program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH C.W.B. dairy neighbors and the local Kaua‘i community.

**Alternatives:** As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation easement are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements:

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State's fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially be considered a new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing important Agricultural Lands, demonstrating the importance of long-term agricultural leases and agricultural infrastructure, water systems and support facilities. (Criterion 3). However after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the
agricultural sector on Kauai, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: search "Hawaii Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
From: Ken Taylor  
Laura McIntyre  
State of Hawai‘i  
Department of Health  
1250 Punchbowl Street  
Honolulu, HI 96813  

Group 70 International, Inc.  
925 Bethel Street, 5th Floor  
Honolulu, HI 96813  

RE: COMMENTS ON HAWAI‘I DAIRY FARM’S ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE, DATED JANUARY, 2015.  

Dear Ms. McIntyre,  

The EIS must look at:  

A) The entire Project must be Described, Including Reasonably Foreseeable Activities.  

Normally Significant Impacts:  

A) Substantially increase traffic or ambient noise.  

B) Impacts which are cumulatively considerable, when viewed in conjunction with the effects of other past, present and probable future projects. The projects contribution must be significant, but need not itself constitute a substantial percentage of the entire cumulative impact.  

Project Alternatives:  

A) Must discuss both mitigations and alternatives to the proposed project.  

B) Each alternative must be described in sufficient detail to permit comparison with the proposed project.  

C) The EIS must focus on alternatives, capable of “substantially lessening” adverse environmental and cultural effects.  

D) The “No Project” alternative must always be considered.  

Kikuyu Grass  

A) Kikuyu grass is an invasive species. Kikuyu grass dose go to seed. In Hawaii we are spending millions of dollars each year to eliminate invasive species, why would we let someone introduce to Hawaii, Kauai an invasive species? Please get a full report from Kauai Invasive Species Committee. Bill Lucey Project Manager at KISCmgr@hawaii.edu. Also if the project goes forward require the project to be responsible for any eradication needed, Island wide.  

Water  

A) A thorough study must be done on groundwater and surface water contamination resulting from this project that would have substantial affect on public health and the environment.  

B) The proposed project has the potential to degrade the quality of the environment, curtail the range of the environment, to the disadvantage of long-term environmental goods.  

C) The environmental effects of the project will cause substantial adverse effects on humans beings, either directly or indirectly.  

Health and safety  

A) If cows are milked twice a day and there is no please on Island for processing, how will the milk be dealt with while weighting shipment to Oahu.  

Significant Impacts on Important Cultural and Historic Sites  

A) The proposed Dairy would significantly Impact important Cultural and historic resources on this site. If the dairy would go forward they will experience sick and dying cows, sour milk or no milk, or milk not suitable for drinking. If this was to happen how would each of these issues be dealt with?  

Economic and Social  

A) Require a socioeconomic Impact analysis.  

B) Economic or social effects of the project must be used to determine the significance of physical changes caused by the project. (Changes such a smell.)  

Mitigation includes  

A) Avoiding the impact altogether by not taking a certain action or part of an action.  

B) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.  

Some Thoughts  

We have an economy that tells us that it is cheaper to destroy earth in real time rather than renew, restore, and sustain it. You can print money to bail out a bank but you can’t print life to bail out a planet. At present we are stealing the future, selling it in the present, and calling it gross domestic product. We can just as easily have an economy that is based on healing the future instead of stealing it. We can either create assets for the future or take the assets of the future. One is called restoration and the other exploitation. And whenever we exploit the earth we exploit people and cause untold suffering. Working for the earth is not a way to get rich; it is a way to be rich.  

Paul Hawken  

Ken Taylor  
taylork021@hawaii.rr.com  
two pages
and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising, given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic era cultural materials associated with the many Land Commission Awards in the project area were nonexistent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bone was found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Mahua‘ulepū Ahupua‘a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The following responses are offered to your comments:

ARCHAEOLOGICAL AND CULTURAL: The Hawaii Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

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Sound is measured in decibels (dB). The State of Hawai'i Department of Health (DOH) rules use the A-weighting sound network (dBA) in the HAR §11-46. Community Noise Control. Sound through the air is similar to ripples on a pond of water. In open space without reflection, ripples spread uniformly in all directions and decrease in amplitude further from the source. In free field conditions such as outdoors, amplitude drops by half as distance doubles (OSHA, 2016). When sound passes close to absorbing ground cover such as grassland and fields, the "soft ground" absorbs extra sound as it passes. The Hawai'i Dairy Farms (HDF) site in Māhāulepū Valley is approximately 2 miles from the resort area, and 1.5 miles from the closest residential areas (on land zoned for agriculture). Typical noise currently generated near the HDF site includes truck ingress/egress along private farm roads, agricultural equipment, and cattle and sheep.

Construction work at the project site will involve activities that may generate an increase in noise levels. However, such exposures will be a short-term condition, occurring during daylight hours. Construction vehicles and activities must comply with DOH Administrative Rules. DOH noise control regulation requires a permit for construction activities that emit noise in excess of 78 decibels or that cost a total of more than $250,000. Mitigation measures to minimize construction noise will include the use of mufflers to suppress loud equipment and limitations on the hours of heavy equipment operation.

The dairy farm will utilize milking equipment contained in the milking parlor, and will use field equipment such as tractors. Under HAR §11-46, agriculture is classified as Zoning District Class C, which specifies maximum permissible sound levels of 70 dBA in the daytime and 70 dBA at nighttime. Dairy operations will generate noise in keeping with agricultural zoning of the parcel. The primary noise receptors in the area would be farmers working nearby parcels. Noise from the dairy will not exceed the DOH threshold, and will not contribute to excessive noise in the region.

**DEMOGRAPHIC AND ECONOMIC**: The potential impacts of Hawai'i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, mowers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua'i, and 8 on O'ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua'i.

The HDF project would contribute to diversification of Kaua'i's economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai'i Island), approximately 10 percent of Hawai'i's milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. Ongoing dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua'i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to ongoing dairy operations would be created on O'ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawaii.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua'i, and 2 indirect jobs on O'ahu for a total increase of 9 jobs. For ongoing operations at the committed herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua'i and another 8 indirect jobs on O'ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**TRAFFIC** The Draft Environmental Impact Statement (EIS) Section 4.18 and 4.25 includes an evaluation of roadways and traffic conditions, along with potential impacts of the dairy farm construction and operation. Primary access to the site is via Māhāulepū Road, a two-way, two-lane road, which is accessible from Kōloa Road (Highway 530) via Ala Kinoiki Road. Within the project area, there is a network of unimproved private agriculture haul roads that provide access to and from Māhāulepū Road.
Roadways in the project area operate smoothly with no periods of heavy traffic. On average, traffic in the region is much lower than urban areas in the state due to the low population of Kaua‘i and rural agricultural demographics of the south Kaua‘i area and Mâhâ‘ulepū. Traffic on Mâhâ‘ulepū Road consists of agricultural vehicles, residential and resort visitor traffic.

During construction, the proposed project is not expected to have a significant short term impact on traffic operations in the project vicinity. Additional traffic will be generated during construction, but will return to normal levels after project completion during day-to-day operations. There will be no change to traffic patterns or infrastructure related to the public roads.

Traffic operations along Mâhâ‘ulepū Road and the surrounding County roads are expected to continue to operate at acceptable levels of service during peak hours of traffic. The projected increase in vehicle movements related to HDF operations for the committed herd size of 699 cows would include 5 daily employees accessing the site, milk tanker and supply trucks every two days, and truck with stock trailer, for a total of 12 additional vehicle trips per day. Daily traffic along Ala Kinoiki Road and Kōloa Road was 8,000 and 6,500 cars daily. HDF-related traffic would add less than one percent additional trips. These additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area.

At a contemplated herd size of up to 2,000 cows, an additional 11 vehicle trips per day would access the HDF site, for a total of 23 vehicle trips daily. Projections for daily vehicle movements in 2035 for Ala Kinoiki Road and Kōloa Road are 7,200 and 9,500 daily vehicles. HDF-related traffic would add less than one percent. Those additional trips would have a minimal effect on traffic conditions at County roadways in the surrounding area. Traffic data is presented in the Draft EIS Sections 4.18 and 4.24.

Construction equipment mobilization will comply with Hawai‘i Department of Transportation and County requirements. Delivery trucks and milk tanker trucks will be in compliance with State and County size and weight limits; no oversized vehicles will be used for ongoing operations.

**ALTERNATIVES:** As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

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- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).
As a land owner on Kauai, I think a dairy farm with 250 cows is more than adequate. A dairy farm with 2000+ cows is irresponsible, greedy, and self-destructive for the whole island. Kauai is called the Garden Island for a reason, let us not ruin that reputation and turn the south shore into a dairy wasteland.

Terry Taylor
Poipu Beach

Dear Terry Taylor:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kauai to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy.” The term "zero-discharge" under the U.S.
Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows' manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term "zero discharge" as it was construed as no nutrients into the system.

The term "grass-fed" was used in the HDF EISP. This term was used to identify HDF's intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds' diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of "grass-fed". The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of "grass-fed", the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area "footprint" will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd's primary food source. Reducing imported feed stabilizes costs and provides a feed source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient "dry matter" grass yields essential to a cow's diet. Additional project-specific trials at the Māhā‘ulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet. Improvements in grass productivity are anticipated to provide up to 85 percent of cows' diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as "mobs", mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows' primary nutrients source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivot can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word "nutrients." Where waste is utilized as a resource, it is being used for the constituent components that provide benefit. The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected to last at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves' initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā‘ulepū site applies to mature dairy cows.
Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

February 19, 2015

Group 70 International, Inc.
925 Bethel St. 5th floor
Honolulu, HI 96813
re: Hawaii Dairy Farms

I am a resident of Kauai and an interested party in the proposed HDF project at Maha‘ulepu. I do have grave concerns about the dairy for the following reasons:

1. Maha‘ulepu is an extraordinary place, worthy of being kept as is. I have always recommended it to tourists and visiting friends as the premier attraction on Kauai because of its natural, unspoiled beauty. To a person, they have conurred that it is unique and worth preservation. A dairy farm with hundreds, indeed, two thousand cows will result in irreparable change/damage to the area. There can be no doubt that animals, like man, affect their environment negatively. How will the EIS address this issue?

2. An industrial dairy farm would be extremely detrimental to the marine life because of run-offs from the dairy to the ocean. Nature cannot be controlled and its effects, mitigated. How can the vagaries of weather be addressed?

3. I am concerned about the health hazards that currently exist on the site. It has been publicly acknowledged that the bacterial counts of Waipili Stream are already considerably above safe limits. The stream should be cleaned up before HDF commences any activity. The EIS must address this issue.

4. I am worried about the proximity of the animals to the wells that provide drinking water to local residents. What will occur should the water become contaminated and people become ill?

5. Although I do not have personal experience with odors and flies near dairies, I have reason to believe that residing within two miles downwind of the dairy, I will be affected. Both my brother who is a waste management specialist with the State of California and a former neighbor who arranged financing for dairy farms confirmed that the odors and numbers of flies will be substantial. What are plans for mitigation?

Finally, I sincerely hope that Group 70 International will be relying on reports and studies from SEVERAL sources for each criterion as they prepare the EIS. ONE or even two or three scientific or professional opinions are not adequate or conclusive. I have heard rumors that Group 70 has previously done work on the HDF project or for Ulupono. Is this true? Please answer by email: tuzu@earthlink.net

Thank you,

Tayomi Susan Thompson

2237 Ilikika Pl.
Ko’ola, HI 96758
experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai‘i Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

**CLIMATE:** Draft Environmental Impact Statement (EIS) Section 4.1 addresses climate conditions. Climatic conditions affect the growth of forage and the health of dairy cows. Heat stress can reduce the productivity of dairy cows, and suitable climatic conditions were an important consideration in siting the dairy.

The Po‘ipu area is generally known for its mild conditions. The area’s climate is greatly influenced by its inland location and valley topography. Winds in the Po‘ipu area are generally from the east-northeast direction (tradewinds) ranging from 5 to 15 miles per hour. Wind conditions vary depending on season and weather conditions, as occasional storms can generate strong Kona winds from the southwest.

Annual rainfall, prevailing winds, and solar radiation conditions at the HDF site are well suited to growing dairy pasture grass and conducting pasture-based dairy operations. Neither the committed herd size of 699 mature dairy cows nor the contemplated herd size of up to 2,000 mature dairy cows will affect climate conditions over the short-term or long-term. No significant impacts are anticipated, and no mitigation would be required.
DEMURG: The potential impacts of Hawaii Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, masons, supervisors, painters, etc. Based on State employment multipliers, indirect employment-related Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County (for a herd size of 699 cows) and a net income of approximately $76,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,700 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10-50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa–Poipū region is on the order of 201–500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

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The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered...
volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalāheo districts), water use in 2035 is projected to be 32.4 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Buit facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs
The groundwater engineer estimated potential nutrient throughfall from the HDI nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient mass would not occur from chronic daily release, rather, episodic rainfall events are estimated to produce the major portion of the nutrient load to groundwater. Induced rainfall events are estimated at an average of 10 days annually. For best practices, no effluent application would occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. Such events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment, and the rapid decrease is likely a result of physical mixing of water bodies. Baseline water quality data and the marine environment. The nearshore area is a highly mixed environment, and the rapid decrease is likely a result of physical mixing of water bodies. Baseline water quality data and the marine environment. The nearshore area is a highly mixed environment, and the rapid decrease is likely a result of physical mixing of water bodies. Baseline water quality data and
were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

**Clean Air Act**

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

**DUST**

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF; so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Odor modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.
Thank you for giving us a chance to comment on the EIS for proposed industrial dairy at Maha`ulepu. As you know, there has been considerable public concern about this project, which does not appear to have significant benefits for the needs of our community but which we feel brings very high risks. In the 15 years that I have lived on Kaua‘i, I have had regular contact with outstanding biologists and environmentalists across the island, all of whom share deep and genuine concerns about the impact of this proposed dairy operation. We hope that there will now be a thorough examination of such fundamental issues as waste management, air and water protection, herd growth triggers, cultural impacts, alternative actions and alternative site selections, and binding mitigation measures. It is our expectation that the draft EIS will at least cover potential impacts on public health, cultural heritage, ecosystems, and natural resources.

In particular, we feel that it there needs to be close consideration of the impact on Hawaiian culture, since the entire area is a spiritual sanctuary. We have an obligation to respect the Hawaiian cultural sites that are are located within or adjacent to the proposed dairy lands. It will be important to take care to honor the many unmarked sites and burial grounds; for, as you are undoubtedly aware, Hawaiians did not label gravesites. We want to see a careful study of the exact locations of these sites, and we want to see a thorough cultural resources study, with clear proposed measures to protect these sources. We also want to see evidence that traditional cultural practices, such as fishing and hunting are being protected.

We are also particularly concerned about potential water quality contamination, and we would like to be reassured by clear evidence that no nutrient of effluent run will occur. We consider this to be a very high risk for drinking water and public health in the region of Koloa and Poipu. We have a related concern that air quality monitoring has not been included in HDF’s proposed management plans. There must be testing done to ensure that effluent smell will not drift into Poipu/Koloa.

We expect the EIS to address the need for environmental indicators to determine whether the land and natural resources can support phase increases in herd size, and we expect that the EIS will include an integrated pest management plan for fly control with intended biological, mechanical and potential pesticide measures.

Because Maha`ulepu is one of the last remaining open spaces on the south shore and is beloved by both residents and visitors, it is important that binding mitigation measures are included in the EIS. An environmental remediation bond and monitoring regimes with guaranteed community involvement are examples of mitigative measures that could be binding. We also believe that the EIS must include plans for site remediation for when the lease ends or HDF ends operations. How will HDF guarantee that Maha`ulepu will be fully restored to its current condition? The operation includes buildings, holding ponds, gates and pens, raceways, piping, fencing, and other infrastructure. Will a there be a remediation fund to cover the cost of returning the site to its natural state?
The EIS needs to take into consideration other reasonable locations both on Kauai elsewhere in Hawaii that meet HDF’s acreage and water access requirements without the high risks involved on this site. We feel that the list of alternatives provided in Hawaii Dairy Farms EIS preparation notice are far too limited. We feel that other alternatives should be suggested and thoroughly examined, including alternate agriculture uses.

Thank you for your attention to these concern.

Yours sincerely,

Anne Thurston
3639 Keoniana Road
Princeville 96722

May 26, 2016

Anne Thurston
athonston@irmt.org

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhūulepū Road
Kauai, Hawai‘i
TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Anne Thurston:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhūulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S.
Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows' manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term "zero discharge" as it was construed as no nutrients into the system.

The term "grass-fed" was used in the HDF EISPN. This term was used to identify HDF's intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd's diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of "grass-fed". The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of "grass-fed", the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area "footprint" will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd's primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient "dry matter" grass yields essential to a cow's diet. Additional project-specific trials at the Māhā‘ulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows' diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as "mob", mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows' primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waiau Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation water and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word "nutrients." Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected to last at least once every 45, days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves' initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā‘ulepū site applies to mature dairy cows.
A total of sixteen sites are identified on the draft list of six historic properties identified through a pedestrian survey of the area. The site survey identified two of the sites on the list to be located outside of the project area and were not included in the final project report. This is consistent with the general trend of historical presence outside of the project area. The project area is well outside of the historic presence as the project area is surrounded by a boundary fence to prevent human access. The sites identified are located outside of the project area, but are not included in the final project report. The archaeological consultant and the dairy project are anticipated to have no impact on these sites. All cultural resources, with the exception of those identified as significant under multiple criteria, are located off-site. No further archaeological work is recommended for these sites. Two of the sites identified for significant historical presence are consistent with the presence of the proposed project, and a further analysis of these sites may be warranted. The remaining sites identified are located off-site and are not affected by the proposed dairy project.
and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 10,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalahoe districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hā‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waipoli Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment log around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waipoli Ditch near the bridge accessing Makawahi Care Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data; however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore
The groundwater and surface water analysis conducted for the Environmental Impact Statement (EIS) revealed that over 1,000,000 pounds per year of phosphorus (totaling 100,000 pounds per year) and one percent of phosphorus (totaling 900 pounds per year) would be discharged from HDF. Phosphorus for both domestic wastewater system and manure effluent is not considered a problem in the aquatic environment, due to a deficit of the nutrient in the marine environment.

The nutrient inputs from the dairy are estimated to occur approximately three tons DM per acre, which is one percent of the potential nutrient discharge from HDF. Phosphorus for both domestic wastewater system and manure effluent is not considered a problem in the aquatic environment, due to a deficit of the nutrient in the marine environment.

The minor contributions of nutrients from episodic rainfall anticipated to occur just after a storm event. Nutrient contributions from irrigation water used on pasture are expected to be a significant contributor of nutrients to the marine environment. Nutrient contributions from irrigation water used on pasture are expected to be a significant contributor of nutrients to the marine environment.

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The minor contributions of nutrients from episodic rainfall anticipated to occur just after a storm event. Nutrient contributions from irrigation water used on pasture are expected to be a significant contributor of nutrients to the marine environment. Nutrient contributions from irrigation water used on pasture are expected to be a significant contributor of nutrients to the marine environment.
Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. ER sections 4.19 and 4.25 provide an evaluation of air quality and odors, including dust and odor. Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day. Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles –moving to and from the barn for the 10- to 15-minute milking sessions. Results for the committed herd size of 699 mature dairy cows show odors would not extend beyond approximately 1,670 feet (within one-third of a mile) beyond the HDF site. In periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offshore odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.
ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action's purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Renoning the land for resort or residential development, or a potential conservation condensation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs, and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3).
- However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Criterion 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai'i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

Please print out and read.

thank you.

Karen Tilley
Dear Sir or Madam,

I feel strongly that serious and irreparable harm will result if the industrial dairy proposed for Maha'ulepu is not relocated to another area. I will focus on one comment but I ask that the many issues and questions presented by Bridget of Friends of Mahaulepu need to be addressed.

The clay soil will not be able to deal with the millions upon millions of feces and urine and it will only be a matter of time that the feces enters the ocean, rivers and --- into the well water. Thus, this is an idiotic, absurd, plan.

I am aghast that a Voluntary "EIS" is being done - by you... by the people who are working for the billion dollar company. That in its own is a travesty...

Human lives are at stake here - and so much more.

This is an environmental catastrophe in the making — There are plenty of examples like the New Zealand Experience and Walkertown Ontario water contamination. DO NOT PROCEED TO KILL AND INJURE THE PEOPLE AND OTHER LIFE HERE ON KAUA'I by allowing the extremely high likelihood of water drinking water contamination to happen.

Karen Tilley

Karen Tilley
P.O box 510021
Kealia Hi
96751

May 26, 2016

Karen Tilley
P.O Box 510021
Kealia, HI 96751
forkarentilley@hotmail.com

Subject: Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice

Māhā‘ulepū Road
Kaua‘i, Hawai‘i

Dear Karen Tilley:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

GROUP 70 OBJECTIVITY: Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai‘i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai‘i Revised Statutes and the "Environmental Impact Statement Rules" (Chapter 200 of Title 11, Hawai‘i Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State and Federal agency. On numerous past EIS projects, the Hawai‘i Chapter of the American Planning Association has recognized Group 70's professional work with Chapter awards for excellence in environmental planning. Part of the EIS scoping process involves Group 70's
experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai’i Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

**SOILS:** Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainfall for use during dryer periods, to filter and buffer potential pollutants from leaching fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawai’i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approaches using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices either identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua’i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soils Resource Report for Island of Kaua’i, Hawai’i.” The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kāhīhi clay at 32 percent, Kalena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kōkūyū grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of soil sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen, phosphorus, calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas “drainage” refers to the movement of water within or from the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential for impacts on waterbodies.

In this way, “poorly drained” soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than “well drained” soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai’i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbon in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai’i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**
The area’s hydrology is shaped by its geology. The Kīlaea area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kīlaea F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kīlaea F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Waters section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kīlaea-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2030, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kīlaea - Po‘ipū - Kalaeo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managingsurface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Wai'ōpili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.
Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: six fence installed in key locations; sand bag barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makaawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the current 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 1,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.
Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occur rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saltwater. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua'i community.

ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawaii Administrative Rules Chapter 11-200 (HR 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua'i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai'i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agnomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities (Criterion 3). However, after years of trying, it appears there was limited interest in such a
venture.

- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: http://tinyurl.com/OEQCKAUAJ

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Max Trapp  
Kapaa, HI 96746  
Max@ReachTheBeach.com

Subject: Hawai‘i Dairy Farms  
Environmental Impact Statement Preparation Notice  
Māhā‘ulepū Road  
Kaua‘i, Hawai‘i

TMK:  (4) 2-9-003: 001 portion and 006 portion  
(4) 2-9-0003: 001 portion

Dear Max Trapp:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, formers, supervisers, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i and 8 on O‘ahu. Construction
employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OKE website at the following URL search “Hawai‘i Dairy Farms”:

http://tinyurl.com/O6OCKAUA

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Aloha;

We live in Poipu and would like to express our concerns about the proposed dairy. We have participated in the various meetings and read the articles in the Garden Island news about the plans. We do not feel there are enough benefits for the island or people of Kaua‘i to offset the potential damage to a historical, spiritual, and treasured site. Why take the risk when there are so many other places to put a dairy? Why select a place that is sacred and pristinely beautiful and pollute it? Hawaii has had enough cultural abuse in it’s past. It’s time to stop.

Dave & Sheri Trentlage
1661 Pe‘e Road, #1302
Koloa HI 96756

May 26, 2016

Sheri & Dave Trentlage
1661 Pe‘e Road #1302
Koloa, HI 96756
STrentlage@davidchapmanagency.com

Subject: Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice

Dear Sheri & Dave Trentlage:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawaii. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

ARCHAEOLOGICAL AND CULTURAL: The Hawai‘i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the...
extended survey area. Only one of the sites is believed to be associated with pre-
contact and/or early historic times. State Site 50-30-10-2250, the agricultural heiau,
and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of
the project area. The remaining sites consist of historic-era bridges, ditches, culverts,
retaining walls, and a flame system dating from the 20th century and are affiliated
with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not
surprising given the massive landscape modifications that occurred during intensive
sugarcane cultivation on the valley floor. Even historic era cultural materials
associated with the many Land Commission Awards in the project area were non-
existent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the
archaeological consultant and the dairy project is anticipated to have no impact on
these sites. No further archaeological work is recommended for the sites. Two of the
sixteen sites are considered significant under multiple criteria, but occur outside the
project area on lands owned by a different landowner. Both sites will not be adversely
affected by the proposed dairy project. No site is related to burial, and no bone was
found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural
resources, practices or beliefs, its potential to isolate cultural resources, practices or
beliefs from their setting, and the potential of the project to introduce elements
which may alter the setting in which cultural practices take place. Information
received from the community indicates the Māhā‘ulepū Alupā‘a, has been and is
currently used for traditional cultural purposes. However, the dairy project area has
not been included in these activities. It is clear that the gathered plants, trails, State
Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved
petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the
leased premises, which will ensure that project activities and any related impacts and
impacts remain within the project area. Based on the research and comments received
from the community, it is reasonable to conclude that, pursuant to Act 50, the
exercise of native Hawaiian rights or any ethnic group related to numerous
traditional cultural practices will not be impacted by establishment of the dairy.

W A T E R  Q U A L I T Y : T e c h n i c a l  c o n s u l t a n t s  c o n d u c t e d  f i e l d  s t u d i e s  a n d
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and F. The location and connectivity of groundwater bodies were determined, and
the quality of groundwater and surface water was documented.

G R O U N D  W A T E R

Hydrology: The area’s hydrology is shaped by its geology. The
formation exhibit extensive weathering which may extend to cons iderable depths –
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That a majority of the d ocumented sites are related to the hist oric-era is not
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s u g a r c a n e  c u l t i v a t i o n  o n  t h e  v a l l e y  f l o o r .   E v e n  h i s t o r i c  e r a  cultural materials
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and F. The location and connectivity of groundwater bodies were determined, and
the quality of groundwater and surface water was documented.

G R O U N D  W A T E R

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built
by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali
formation exhibit extensive weathering which may extend to considerable depths –
as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite,
a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with
alluvium, which generally extends about 60 feet under the surface and is underlain
by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa
series. The alluvial material is highly weathered lava and is comprised of dark
brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified
two groundwater bodies within the valley: (1) groundwater located in a deep
aquifer system within unweathered volcanic material, which is buried beneath thick
alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The
aquifer of highest value and use resides deep within the unweathered volcanic
material. The alluvial material blanketing the valley floor is less permeable than the
unweathered volcanics by orders of magnitude. Hydraulic conductivity represents
the ability of soils to transport water given a hydraulic gradient, and is expressed in
units of feet per day. It is a measure of how easily water will move within the
ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley
and the HDF site ranges from 105 – 50 feet per day. The hydraulic conductivity of
soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day.
Therefore, water movement through soils under the proposed dairy site is 10 times
slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether
the two waterbodies within Māhā‘ulepū may be connected. Four studies were
conducted to determine whether the shallow groundwater in the alluvial material
did not discharge into the lower aquifer confined in the unweathered volcanic
material at depth, which is the source of potable water. The results demonstrate
there is no hydrologic connection between the deep aquifer in the unweathered
volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft
EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature
dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million
gallons per day (MGD), of potable (drinking water quality) water from groundwater
provided through an on-site well. The State of Hawaii’s Department of Health Milk
Rules require that potable water be used for milk production, both in the milking
parlor and for milking operations; another potable water use will be for livestock
drinking water. Should HDF decide, in the future, to expand to the contemplated
herd size of up to 2,000 mature dairy cows, potable water demand will increase to
84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD
produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane
plantation era. All potable water used as wash water will be re-applied to pasture
and thus remain a part of the evapotranspiration cycle. Long-term groundwater
supply impacts are not anticipated to be significant.
The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F Well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kālihēo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawawhi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch concern about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations; Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top...
Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipioi Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occur rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWBR, dairy neighbors and the local Kauai community.

ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and compared environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai'i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure...
and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand, thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED-AP
Principal Planner
May 26, 2016

Luis Trevino
2551 Ala Kinoiki
Koloa, HI 96756

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā'ulepū Road
Kaua'i, Hawai'i
TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Luis Trevino:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai'i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā'ulepū Valley on the island of Kaua'i to produce fresh, locally available nutritious milk for Hawai'i families. The rotational-grazing method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.
The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various pastures and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water is supplied to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflect on the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy...
start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua’i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai’i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that have not given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

**Natural Hazards:** The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhāulepū property is not known to experience flooding conditions. The area is located within Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai’i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the 0.2% annual chance floodplain. The site has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands.

Although they occur infrequently, Kaua’i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhāulepū region during and following the hurricanes that affected Kaua’i in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhāulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua’i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRCS, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

**Demographic and Economic:** The potential impacts of Hawai’i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, masons, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with the HDF project would be created on O’ahu.

The HDF project would contribute to diversification of Kaua’i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai’i Island), approximately 10 percent of Hawai’i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua’i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O’ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000.
annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36.7 million pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow herd.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY**: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology**: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāule‘pū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is bordered by thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāule‘pū Valley and the HDF site ranges from 105 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāule‘pū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydraulic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water**: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāule‘pū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evaporative cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāule‘pū 14 well and the County’s Māhāule‘pū F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāule‘pū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring**: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water
quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōkō-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōkō - Po‘ipū - Kalaneo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Haʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data; however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a Sanitary Survey of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural
fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 18,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 35 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall is anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological contaminants are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy operations include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drypilot” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two
separate milking cycles—moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM_{10} and PM_{2.5}) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM_{10} is 2.01 μg/m^3, well below the State standard of 150 μg/m^3. The estimated concentration for PM_{2.5} is 0.23 μg/m^3, well below the Federal standard of 35 μg/m^3 (see Draft EIS Section 4.19 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odor emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670 feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaii Dairy Farms”: [http://tinyurl.com/EOQCKAUAJ](http://tinyurl.com/EOQCKAUAJ)

Thank you for your participation in the environmental review process.

Sincerely,

**GROUP 70 INTERNATIONAL, INC.**

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear George Valentini and Pam Littlefield:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai’i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

LAND USE: The historical and existing land uses of the project site and surrounding Māhōlepu Valley were examined in the Draft Environmental Impact Statement (EIS), and uses proposed by the Hawai’i Dairy Farms (HDF) project were evaluated in the context of county and state land use designations for the area. The evaluation of land use is presented in Draft EIS Chapter 4.4, and the project’s consistency with government plans and policies is presented in Draft EIS Chapter 5.0.

The south shore of Kaua’i is home to some of the most productive farm land in the state, attributed to consistent sunshine, ample fresh water, and a large amount of Class A and B soils (with “A” representing the class of highest productivity soils and “E” representing the lowest). The large tracts of farmland, including those of...
Mahaulepu Farm and Grove Farm, allow for stability in support of farm ventures, help maintain regional water systems and provide agricultural employment for Kaua‘i residents in addition to fresh, local food.

The project site is on agricultural land in Māhāulepū Valley, an area with a long history of agricultural use as it was the first place in the island chain where sugarcane was commercially grown. The site is in the Agricultural District per State Land Use District designations, and per the County of Kaua‘i zoning ordinance. The site consists of land classified as Prime per the State Department of Agriculture’s Agricultural Lands of Importance to the State of Hawai‘i (ALISH). The HDF site is outside of the County-designated Special Management Area under the Coastal Zone Management Program.

In 2005, the State established Important Agricultural Lands (IAL) by statute. The purpose of IAL is to conserve and protect agricultural lands, promote diversified agriculture, increase agricultural self-sufficiency and assure the availability of agriculturally suitable lands. The designation process determines land meeting physical requirements including contiguous, functional land units large enough to allow flexibility in agricultural production near appropriate infrastructure and water, with high quality soil agricultural productivity ratings under the Land Study Bureau of University of Hawai‘i.

In 2011, Mahaulepu Farm LLC filed a petition with the State of Hawai‘i Land Use Commission to designate 1,533 acres of agricultural lands in Māhāulepū (including 557 acres that make up the HDF site) as IAL. IAL designation meets the objectives of the State HRS 205-42 by contributing to the maintenance of a strategic agricultural land resource base to support a diversity of agricultural activities and opportunities that expand agricultural income and job opportunities. See Figure 4-4-2 in DEIS Section 4.4.

The designation process determined that the land meets a number of physical requirements established in HRS 205-45, including contiguous, functional land units large enough to allow flexibility in agricultural production near appropriate infrastructure and water, with 88.5 percent of the area featuring an overall soil agricultural productivity rating of “B” per criteria established by the Land Study Bureau of University of Hawai‘i.

The development and long-term operation of HDF will be in full compliance with its agricultural State Land Use District designation, ALISH classifications, and County zoning. The dairy farm will embody the intent of the IAL designation per the Hawaii State Constitution, by using these protected lands for the intended purpose of diversified agriculture, food production and agricultural self-sufficiency. HDF development of a dairy also supports the “secondary intent” for lands in the Agriculture land designation, to provide an opportunity for Kaua‘i citizens to reside in an agricultural community. This is in contrast to the described “agricultural subdivisions” that have changed parts of Kaua‘i intended for a rural landscape, with development as quasi-suburban landscapes dotted with residences on large lots.

Overall, the project provides long-term benefit and support of agricultural lands and industry through continued use in keeping with zoning and IAL designation. Long-term operation of the dairy does not preclude the region for future protection in a coastal park at Māhāulepū.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix I.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, masons, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment associated with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to ongoing dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $60,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.
The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**PESTS:** A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhāulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the green bottle fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila musrophila, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-‘ōhi‘a forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which bury manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhāulepū Valley will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pats in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kīlauea-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ala Kinoiki Road between Kīlauea and Po‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animals wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

**AIR QUALITY:** As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

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http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Beth Valenziano
520 Country Lane
Glenview, IL 60025

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Beth Valenziano:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.
The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the wallways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Wata Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy
start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā‘ulepu site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawaii with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no mitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions - and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER
Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Nāpali formation lavas of the Waimea volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepu Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary erosion of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.
The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater produced through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlors and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well within the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kau‘ai community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kau‘ai will increase county-wide by 17,300 residents by 2030. The South Kau‘ai population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kau‘ai region (the Kōloa - Po‘ipū - Kalaheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off the south slope of the Hā‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waipōlli Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Bulk facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed
in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment bags around drain inlets.

**Surface Water Quality:** The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makaowaii Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāulepi Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāulepi and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāulepi Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulate during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageway; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 423 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāulepi will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge to the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po’ipū region were also calculated. Nitrogen input to the marine environment in the Po’ipū region is calculated to be 38,540 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po’ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

**Impacts to the Nearshore Marine Environment:** An assessment of groundwater and surface water interaction with the marine water downstream from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input to the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment
which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kauai community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawai'i Dairy Farms": [http://tinyurl.com/OEQCKAIUJ](http://tinyurl.com/OEQCKAIUJ)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

From: Robert Vlach <bobvlach@gmail.com>
Sent: Wednesday, February 18, 2015 8:11 PM
To: HDF
Subject: Maha'ulepu Valley and Coastline Concerns

HDF

Dear Sir;

My name is Robert Vlach. I currently live in Ashland, Oregon. I physically am not a resident of Kauai, however my heart is a full time resident. Please allow me to explain.

My wife, Sherita, and I were married on Maha'ulepu Beach in 2004. This spot was a great favorite of hers. Just about five years later she contracted Pancreatic cancer and passed on from this life. In her memory we held a family memorial on our spot in August of 2009. I and the family have returned to Hawaii many times in the past few years. In April of this past year my son, Michael, and I finished installing a labyrinth in her honor. In the past year we have received many comments from visitors all over the world when passing by the site, indicating the attraction of this pristine stretch of beach to a wide assortment of hikers and naturalists. We only used native rocks and plants to complete the project so as to not disturb the beauty of this area which has a long history of value both by the Kama‘aina and tourist alike.

As we were laboring on the site we were informed of the proposal for a large Dairy operation in the Maha'ulepu Valley. At first I was not so concerned as it seemed a small "local" venture would be an addition to the economy. However as more information comes to light I am having great angst and concern over this proposal.

In the first place the frail limestone soil composition of the coast, and the coral seem to be susceptible to damage from the runoff from this operation. The proposal appears to be way too large for the Aina to accommodate such an influx of waste matter as well as taxing the already stressed domestic water supply.

In the second place the smell of such an operation would definitely adversely effect the tourist industry on the South shore. I spent much of my early years in California near Stockton and Manteca and the smell of their stockyards is intense. No one is going to spend $300 to $800 a day at the Hyatt with this type of pollutant present.

Lastly this area is one of great historical, archaeological, and bio-diversity interest and with no less than two Heiau sites must be preserved from damage.

I know that many have already brought up concerns on this subject. And I know they have a much more professionally developed study on the issue. I just urge from a personal viewpoint that this proposal be closely looked at before allowing this large an operation on such a small and sensitive section of an island I love dearly.

Mahalo Nue Loa for reading this appeal. Bob Vlach "Lopaka"
Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua'i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a "Custom Soils Resource Report for Island of Kaua'i, Hawai'i." The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

For dairy operations with 700 or more mature dairy cows, additional regulatory permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

SOILS: Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during dryer periods, to filter and buffer potential pollutants from leaching fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yost and Nicholas Krueger of the University of Hawai'i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.
In this way, "poorly drained" soils may represent less risk of nitrate and nitrite leading to associated waterbodies than "well drained" soils (Yost, 2016). As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawaii soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy's focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbon in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing seasons. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

ARCHAEOLOGICAL AND CULTURAL: The Hawaii Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flume system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic era cultural materials associated with the many Land Commission Awards in the project area were nonexistent, as explored through survey and subsurface exploration.

The six historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the sixteen sites are considered significant under multiple criteria, but occur outside the project area on lands owned by a different landowner. Both sites will not be adversely affected by the proposed dairy project. No site is related to burials, and no bones were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural resources, practices or beliefs, its potential to isolate cultural resources, practices or beliefs from their setting, and the potential of the project to introduce elements which may alter the setting in which cultural practices take place. Information received from the community indicates the Māhāulepū Ahupua'a, has been and is currently used for traditional cultural purposes. However, the dairy project area has not been included in these activities. It is clear that the gathered plants, trails, State Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved petroglyph boulder, are all located outside of the project area.

The project will be fully ensconced by perimeter fencing along the boundary of the leased premises, which will ensure that project activities and any related impacts are contained within the project area. Based on the research and comments received from the community, it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights or any ethnic group related to numerous traditional cultural practices will not be impacted by establishment of the dairy.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (\(\text{CH}_4\)) from enteric fermentation, and both methane and nitrous oxide (\(\text{N}_2\text{O}\)) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.
DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m3, well below the State standard of 150 μg/m3. The estimated concentration for PM2.5 is 0.23 μg/m3, well below the Federal standard of 35 μg/m3 (see Draft EIS Section 4.19). Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Diane Walden:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. The Department of Health forwarded a copy of your comments to Group 70 International in order to be included in the Draft Environmental Impact Statement (EIS) analysis. This letter was prepared in response to your comments.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E...
and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented. The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-acres of pasture will be applied and no animal will deposit manure as the area will not be used for grazing. Additional information in the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the movement of water within the ground. The hydraulic conductivity of the alluvium that underlies Mäkia Valley will be 10 times slower than the neighboring area.

Groundwater Monitoring: Four groundwater monitoring wells were installed by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths—up to 400 feet below sea level. Weathered lava in the area is typically Saprolite, a type of soil that forms in the upper horizons of the weathering profile. Saprolite is typically rich in organic matter and nutrients, making it suitable for agriculture. The alluvium is highly weathered lava and is comprised of dark brown to black silt and clay. This material is typically less permeable than the unweathered lavas, which are more permeable and can easily transmit water. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis conducted for the Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer that covers the valley floor, and (2) groundwater located in the alluvium. The alluvium is highly permeable and can easily transmit water. The groundwater in the alluvium is recharged by precipitation and surface runoff, and it discharges into the valley stream systems. The surface water analysis was conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer located in the unweathered volcanic material. The results demonstrated that there is no hydrologic connection between the shallow and deep aquifers. Therefore, the shallow groundwater is not a significant source of recharge for the deep aquifer.

The assessment also considered the impact of the dairy on surface water. The dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD). This is a significant amount of water and requires careful management to ensure that it does not impact the local water resources. The dairy will provide water for the milk producing parlor and for milking operations, and another potable water source will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 50,000 gpd, which is 0.17 MGD. This is a substantial increase and requires careful management to ensure that it does not impact the local water resources.
that originate at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makaawahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a Sanitary Survey of the Māhā‘ulepū and adjacent waterways. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāulepū Valley. The deme canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal wallow, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageways (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EF5 provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient runoff would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater
and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipu region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downstream from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiohiki Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditch downs gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua'i community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawaii's Dairy Farms": http://oecd.hawaii.gov/HDF

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1. Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the
energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, post-dock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawaii is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the dairy application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to the ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāʻulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and diversify the beef market in Hawaii with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as HST or rbGH.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawaii’s Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.
HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy operations or expansion. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.
animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,900 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa- Po‘ipū- Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha'upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makouwhi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and it is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

**Long-term Operations, Setbacks and Buffers:** Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

**Nutrients from Effluent Irrigation and Commercial Fertilizer Application:** The natural fertilizer from manure deposited directly to pasture and effluent collected...
from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūle`pū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Po`ipū region were also calculated. Nitrogen input to the marine environment in the Po`ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po`ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipālli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents with the committed water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua`i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.
Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM_{10} and PM_{2.5}) measured on the island of Kauai, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM_{10} is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM_{2.5} is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4.19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied to odor isopleths (a line used to map all points above a given odor level) to create odor isopleths (a line used to map all points above a given odor level) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual odors from the proposed dairy project are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

**ALTERNATIVES:** As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawaii Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation park with processing center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce, or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kauai’s; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements.
defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).

- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3).

- However, after years of trying, it appears there was limited interest in such a venture.

- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
My husband and I own a small condo in the Poipu area and we will be retiring to the beautiful island of Kauai within the next 3 years. We were so shocked to hear that there is a possibility of an industrial dairy farm being constructed on Mahaulepu with a herd of up to 2,000 cows. My first thought was “What are they thinking?” and “I must have heard this wrong.” With all the strict regulations that the county government has for building height, street light wattage, swimming pool construction, protection of the wildlife, etc., I never thought that something like this would be a possibility. We chose Kauai as a place to retire because Kauai, of all the Hawaiian Islands, seemed to have their act together when it came to the preservation of true Hawaii. WHAT HAPPENED?

My mother was raised in a dairy farming family. My grandparents were dairy farmers and a number of generations before them were as well. They all used “sustainable” and “grass-fed” farming practices. My cousins continued the family dairy farming up until just recently.

My family’s farm consisted of 100 acres with a total of 25–30 humbly treated adult purebred Holstein cows. They grazed daily in the summer, spring and fall on 10-20 acre pastures in a rotational manner to preserve the soil. The land was also used to grow all of the feed required for the animals. They ate only food grown on the land within the 100 acres. Grains (no corn) were grown and stored for winter feed and to augment feed when they arrived in the barn for milking twice a day. This was and is sustainable grass-fed dairy farming.

HDF is proposing a “grass-fed” dairy with cows grazing on 500 acres of land that is within 4/5ths of a mile of the Pacific Ocean at Mahaulepu. They plan to start production with 699 cows and then move to 2,000 cows over time. In HDF’s proposal, at start-up they will have 115 cows in each 4 acres of paddock area per day and at full production 330 cows on each of these paddocks.

While 500 acres sounds like a lot of land to graze 699-2,000 cows on, basically it means that during the start-up phase, seven cows would be grazing and defecating on 10,000 square feet of “pasture,” the size of a standard house lot. At full production at least 17 cows would graze and defecate on the same area.

According to the EPA a dairy cow defecates at least 120 pounds of wet manure every day. In their Waste Management Plan, page 42, HDF reports that they anticipate their dairy cows will each weigh 1,200 pounds and produce 143 pounds of wet manure per cow daily. Using HDF’s own waste expectations, at full production HDF’s 2,000 cows would produce 2,648 pounds of wet manure on a 10,000 square foot area every day! Imagine having more than one ton of manure added to your lot daily. My husband and I live in a house on a lot of about 10,000 square feet. As I write this and look out my window and try to understand the impact of the concentrated rotational dairy proposed by HDF, I can’t imagine anything left of my yard after 17 cows graze, defecate and urinate for even one day.

According to HDF, the cows rotate through the grazing paddocks, returning to the pasture paddocks first grazed every 18 days. Not only will the grass be unlikely to re-generate in that interval but the manure will still be wet and likely contribute to hoof rot when trampled by the returning herd.

The dense grazing will not only sicken the cows, there is also a very real risk to the public’s health. There were cases of E. coli in 2006 that were caused by spinach contaminated by feces from cattle nearby. There were three deaths and many were sickened. With all the rain on Kauai, won’t there be a risk of contamination just by run-off? Will the flies carry disease to our food or any containers we eat from?

What about the chemicals that will be used to clean the cows and the milking structure? I know they use iodine to wash cow udders. When that gets into the run-off, who or what does that harm?

In the Poipu area, we have wildlife that is already protected like the monk seal and the sea turtle. We also have a tremendous number of fish species living on the reefs on the island. Will they be harmed from the run-off? Will the humpback whales stop swimming by?

I have only touched on a few concerns if this project were allowed to go forward. Everyone needs to push to stop this and keep the Poipu area pristine and ensure an ongoing economy in tourism. If this industrial dairy farm is allowed to pass it will probably be the cause of many health issues (especially for children), wildlife loss from the run-off and the loss of many jobs in the tourist industry. The tourists will not come to visit due to the overwhelming smell and fly problem.

There are many more concerns if this project is allowed to move forward. I feel it should be everyone’s responsibility to stop this project. We need to keep the children healthy, save the wildlife’s habitat and preserve the Poipu area as a thriving tourist destination.

...
Dear Mr. Wong,

My wife and I own a home in Koloa on the island of Kauai and am writing you concerning the Hawaii Dairy project planned for the Maha'ulepu area on Kauai. I read a letter in the Garden Island newspaper that expresses my thoughts exactly. I am copying it here in the body of this letter because it is so well written and states what I know to be true as well. I oppose this dairy project going forward because of the harm it will do to the environment as well as to the property values and quality of life. Mahalo.

“My husband and I own a small condo in the Poipu area and we will be retiring to the beautiful island of Kauai within the next 3 years. We were so shocked to hear that there is a possibility of an industrial dairy farm being constructed on Mahaulepu with a herd of up to 2,000 cows. My first thought was "What are they thinking?" and "I must have heard this wrong." With all the strict regulations that the county government has for building height, street light wattage, swimming pool construction, protection of the wildlife, etc., I never thought that something like this would be a possibility. We chose Kauai as a place to retire because Kauai, of all the Hawaiian Islands, seemed to have their act together when it came to the preservation of true Hawaii. WHAT HAPPENED?

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***

Beverley Ellul is a resident of San Jose, California."
Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices order identify design and construction standards related to drainage, materials, operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua’i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has mapped and classified soils for more than 95 percent of the United States. Comments received during the initial scoping for this EIS included a "Custom Soils Resource Report for Island of Kaua’i, Hawai’i." The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kahi Clay at 32 percent, Ka‘ena Clay Brown Variant at 29 percent, and Luahalei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugarcane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second mound of field sampling was conducted in 2015, and focused on evaluation of soils characterized as "poorly drained", and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with application of manure effluent. Laboratory analysis determined electrical conductivity and exchangeable sodium percentage, in addition to nutrient levels of nitrogen, phosphorus, calcium, magnesium, and potassium.

Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas "drainage" refers to the movement of water within the soil profile. Poorly drained soils typically have low hydraulic conductivity, or a slow rate of groundwater movement through the soil. This slow movement can create anaerobic conditions, which typically result in higher rates of denitrification. This is the conversion of potentially nitrates and nitrites to gaseous forms, which reduces the potential for impacts on waterbodies.

In this way, "poorly drained" soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than "well drained" soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of nutrients such as potassium and phosphorus is also reduced. Soil types at the HDF site are known to adsorb and retain large amounts of phosphorus. Under the NRCS phosphorus leaching index for Hawai’i soils, HDF soils show low risk for leaching. With low risk, phosphorus can be applied at rates greater than crop requirements if manure or other organic materials are used to supply nutrients.

The dairy’s focus on robust and healthy grass growth will build organic matter in soils through use of manure as a natural fertilizer. Soil can incorporate carbon from the atmosphere, which benefits soil health. According to recent studies in the Soil Science Society of America Journal, the conversion of formerly tilled cropland to grazed pasture can drive substantial accumulation of organic carbons in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential soil organic matter and carbon dioxide sequestration benefits are likely greatest in highly degraded soils in warm subtropical climates, partly due to long pasture-growing season. Long-term soil impacts are anticipated to result in improvement to the physical, chemical, and biological condition of the soil.

ARCHAEOLOGICAL AND CULTURAL:

The Hawai’i Dairy Farms (HDF) project is subject to a historic preservation review by the State Department of Land and Natural Resources, State Historic Preservation Division (SHPDD) under HRS Chapter 6E and Chapter 13-284. An Archaeological Inventory Survey (AIS) and a Cultural Impact Assessment (CIA) were conducted by Scientific Consultant Services (SCS) for the proposed project. EIS Sections 4.7 and 4.8 provide an evaluation of archaeology and cultural resources, with technical studies in Appendix G and H.

A total of sixteen historic properties were identified through a pedestrian survey of the project area and an extended survey area of 100 meters of the northern boundary. Six historic-era sites occur in the project area and 10 sites occur in the extended survey area. Only one of the sites is believed to be associated with pre-Contact and/or early historic times. State Site 50-10-19-2250, the agricultural heiau, and State Site 50-30-10-2250, a carved petroglyph boulder, are all located outside of the project area. The remaining sites consist of historic-era bridges, ditches, culverts, retaining walls, and a flame system dating from the 20th century and are affiliated with sugarcane cultivation.

That a majority of the documented sites are related to the historic-era is not surprising given the massive landscape modifications that occurred during intensive sugarcane cultivation on the valley floor. Even historic era cultural materials associated with the many Land Commission Awards in the project area were non-existent, as explored through survey and subsurface exploration.

The sixteen historic properties have been assessed for significance by the archaeological consultant and the dairy project is anticipated to have no impact on these sites. No further archaeological work is recommended for the sites. Two of the
sixteen sites are considered significant under multiple criteria, but occur outside the
project area on lands owned by a different landowner. Both sites will not be adversely
affected by the proposed dairy project. No site is related to burials, and no bones
were found. Such sites have been reported along coastal areas in sand dunes.

The cultural assessment examined the potential effect of the project on cultural
resources, practices or beliefs, its potential to isolate cultural resources, practices or
beliefs from their setting, and the potential of the project to introduce elements
which may alter the setting in which cultural practices take place. Information
received from the community indicates the Māhāuleipā Ahupua'a, has been and is
currently used for traditional cultural purposes. However, the dairy project area has
not been included in these activities. It is clear that the gathered plants, trails, State
Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved
petroglyph boulder, are all located outside of the project area.

The project will be fully enclosed by perimeter fencing along the boundary of the
leased premises, which will ensure that project activities and any related impacts
are contained within the project area. Based on the research and comments received
from the community, it is reasonable to conclude that, pursuant to Act 50, the
exercise of native Hawaiian rights or any ethnic group related to numerous
cultural practices will not be impacted by establishment of the dairy.

**ALTERNATIVES:*** As a part of the DEIS, alternatives were evaluated that could
attain the objectives of the action's purpose and need, and were compared with
environmental benefits, costs, and risks of each reasonable alternative against those
of the proposed dairy project. Further discussion of alternatives can be found in
DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action's
purpose and need, and compares environmental benefits, costs, and risks of each
reasonable alternative against those of the proposed action. Additionally,
reasonable land use alternatives that emerged from public input during the project
scoping phase are documented and briefly discussed. The alternatives that do not
meet the project purpose are not advanced for analysis of environmental benefits,
costs, and risks. The Environmental Impact Statement Rules, Hawai'i Administrative
Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could
attain the objectives of the action, regardless of cost. There is no requirement for the
alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed.
Rezoning the land for resort or residential development, or a potential conservation
condemnation are two uses that were examined and eliminated from analysis.
These options would not be reasonably viable given the existing private land tenure
and existing zoning. Two additional alternatives were considered as reasonable land
uses as they could be permitted within the existing State Land Use Agricultural
District and County Agricultural Zoning District. These options include Agricultural
Park with Processing Center, and development of an Agricultural Subdivision. The
alternatives were examined and eliminated from further analysis, however, as they
would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose.
Rigorous exploration and evaluation of the environmental impacts of the
alternatives, including those that might enhance environmental quality or avoid,
reduce or minimize some or all of the adverse environmental effects, costs and risks.
These alternatives include: (1) the development of a Conventional Feedlot Dairy (a
non-pasture-based dairy) at the same location; (2) development of the Pasture-
Based Dairy at an Alternative Location on Kaua'i; and (3) milk products processing
by HDF. The alternative of "No Action" is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of
potential alternatives, including the two alternative development scenarios.
Although the alternatives are potentially reasonable uses under existing zoning and
neighboring uses, each fails to comprehensively fulfill the project requirements
defined by the eight Project Objectives and the four established Evaluation Criteria
(Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the
following statements.

- Only one of the alternative actions (conventional feedlot alternative) would
  create a commercial scale dairy operation in Hawai'i, with the capability to
  produce 10 percent of the State’s fresh milk demand thus reducing
dependence on imported milk (Objective 1). This alternative, however, would
  not reduce reliance on costly imported fertilizer and feed (Objective 2); grow
  local quality grass as a primary feedstock (Objective 3); and would not utilize
  currently used for traditional cultural purposes. However, the dairy project area has
  not been included in these activities. It is clear that the gathered plants, trails, State
  Site 50-30-10-2250, the agricultural heiau, and State Site 50-30-103094, a carved
  petroglyph boulder, are all located outside of the project area.

The DEIS evaluates alternatives that could attain the objectives of the action's
purpose and need, and compares environmental benefits, costs, and risks of each
reasonable alternative against those of the proposed action. Additionally,
reasonable land use alternatives that emerged from public input during the project
scoping phase are documented and briefly discussed. The alternatives that do not
meet the project purpose are not advanced for analysis of environmental benefits,
costs, and risks. The Environmental Impact Statement Rules, Hawai'i Administrative
Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could
attain the objectives of the action, regardless of cost. There is no requirement for the
alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed.
Rezoning the land for resort or residential development, or a potential conservation
condemnation are two uses that were examined and eliminated from analysis.
These options would not be reasonably viable given the existing private land tenure
and existing zoning. Two additional alternatives were considered as reasonable land
uses as they could be permitted within the existing State Land Use Agricultural
District and County Agricultural Zoning District. These options include Agricultural
Park with Processing Center, and development of an Agricultural Subdivision. The
alternatives were examined and eliminated from further analysis, however, as they
would not fulfill the project purpose.
In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria:

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capial investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Adress the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
May 26, 2016

Mary Waldrop
marywaldrop@yahoo.com

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Mahā‘ulepū Road
Kaua‘i, Hawai‘i

Dear Mary Waldrop:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS:

Families. The rotational-grazing method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice, published January 23, 2015, described the proposed pasture-based rotational grazing system as a "zero-discharge, grass-fed dairy". The term "zero-discharge" under the U.S.
Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture or a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not in used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of cows. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways, and cow races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected to last at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā‘ulepū site applies to mature dairy cows.
Animal manure is a valuable resource in agriculture, providing nutrients and improving soil quality. Dung beetles, for example, aid in the decomposition of manure, helping to cycle nutrients back into the soil. In the Hawai‘i Dairy Farms (HDF) project, the use of dung beetles is proposed to manage manure, with the potential for reducing the need for synthetic fertilizers and improving soil health. The project areas include the Ka‘ū District, where the presence of dung beetles and other invertebrates has been noted, indicating a potential for increased biodiversity and ecosystem services.

The HDF site is located within a volcanic landscape, characterized by alluvial deposits formed from lateral spreading of lavas from the Mauna Loa and Kilauea volcanoes. The alluvial material is highly weathered lava and is comprised of dark alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth. The alluvial material is less permeable than the unweathered volcanics by orders of magnitude, affecting groundwater and surface water resources.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Mahi‘ale Valley shows that water movement is significantly slowed.

The presence of dung beetles and other invertebrates has been noted at the HDF site, indicating a potential for improved soil health and ecosystem services. The use of dung beetles in the HDF project could contribute to a more sustainable agricultural practice, reducing the need for synthetic fertilizers and improving soil quality. Additionally, the presence of native insects such as the Kahoolawe fruit fly can be monitored to ensure the conservation of native biodiversity.

The Ka‘ū District, where the HDF project is located, is known for its diverse insect species, including the native Hawaiian fruit fly. The insect survey conducted in January 2016 identified the presence of several pest species associated with cattle, including the horn fly and the greenbottle fly. These flies and other pests are common in areas with high livestock populations. It is possible that the HDF project could influence the fly population dynamics, with the potential for both positive and negative impacts on the local ecosystem. The management of pest populations is critical to maintaining a healthy livestock population and ensuring food safety.

The HDF project includes measures to address fly population growth through diligent cleanup and sanitation procedures. The use of integrated pest management (IPM) techniques could further reduce the need for synthetic insecticides and promote a more sustainable approach to pest control.

In conclusion, the HDF project presents an opportunity to improve soil health and ecosystem services through the use of dung beetles and other invertebrates. The project could contribute to a more sustainable agricultural practice, reducing the need for synthetic fertilizers and improving soil quality. Additionally, the presence of native insects such as the Kahoolawe fruit fly can be monitored to ensure the conservation of native biodiversity. The management of pest populations is critical to maintaining a healthy livestock population and ensuring food safety. The HDF project includes measures to address fly population growth through diligent cleanup and sanitation procedures. The use of integrated pest management (IPM) techniques could further reduce the need for synthetic insecticides and promote a more sustainable approach to pest control.
and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōlea-Poʻipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two water bodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōlea F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōlea F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōlea-Poʻipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2023, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōlea - Poʻipū - Kalalau districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed. The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hāʻupu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waipōlai Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment log around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waipōlai Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore...
increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 14 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively dispenses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.
Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua‘i community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai‘i Dairy Farms”: [http://tinyurl.com/3BOYt9A]

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

[Signature]

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Subject: Hawai‘i Dairy Farms

Environmental Impact Statement Preparation Notice

Mahā‘ulepū Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Martin Weil:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. Ongoing dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to ongoing dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $60,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 44 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Addition employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For ongoing operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, water or waste discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

We will provide you with a copy of the Environmental Impact Statement. Thank you for your participation in the environmental review process.
ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action's purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action's purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules Hawai'i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Renouncing the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua'i; and (3) milk products processing by HDF. The alternative of "No Action" is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai'i, with the capability to produce 10 percent of the State's fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potato water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua'i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural lands demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai'i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai'i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai'i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua'i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaii’s Dairy Farms”: [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Cynthia Welti:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai'i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhāʻūlepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai'i families. The rotational-grazing method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a "zero-discharge, grass-fed dairy". The term "zero-discharge" under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows' manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term "zero discharge" as it was construed as no nutrients into the system.

The term "grass-fed" was used in the HDF EISPN. This term was used to identify HDF's intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd's diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of "grass-fed". The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of "grass-fed", the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area "footprint" will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.5.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd's primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient "dry matter" grass yields essential to a cow's diet. Additional project-specific trials at the Māhāʻūlepū site on Kauai have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows' diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as "mobs", mimicking the natural social order of herds. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races designed to provide a comfortable path under hoof. The
Animals in various stages of lactation and rest will be transferred between the HDF and the primary nutrition source and minimize stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

Young female calves (both on the Hawai'i Island) will be raised until ready to return to pasture. Smaller paddocks located near the dairy facility will be used as temporary pasture management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated and component in handling may result in the use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine milk testing will be conducted to detect residues of antibiotics and other substances.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigation. The potential impacts of Hawaii Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Pacific Economic Associates. The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average approximately 12 jobs per year during the development period. This direct-indirect employment associated with the HDF project would be expected to average approximately 36 jobs, of which 30 would be on Kona.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, method of application, and timing of plant nutrients and soil amendments. The Nutrient Management Systems (NMS) has several components, one of which is the application of nutrients to the land.

NRCS provides technical guidance on applying agricultural waste depending on the uses of water, and how to apply nutrients to the land. The nutrient application needs of the farm depend on the type of waste and the desired use of the waste. The waste is applied in the field at the time of the livestock's needs. Where water is being used in the field, it is applied according to the actual irrigation needs of the farm.

The irrigation system is controlled using computer software and GPS receivers to allow efficient and precise application of irrigation and/or dilution of effluent on the pasture. The effluent application rate is controlled by computer software and GPS receivers to allow efficient and precise application of irrigation and/or dilution of effluent on the pasture.

The effluent storage ponds are used to accommodate 30 days of storage for up to 2,000 mature dairy cows and over 85 days of storage for 699 mature dairy cows. The pond will be filled at any time during the production period and will be filled at the end of the production period. The effluent storage ponds will be filled at approximately 30 days of storage for 2,000 mature dairy cows and 85 days of storage for 699 mature dairy cows. The effluent storage ponds will be filled at the end of the production period. The effluent storage ponds will be filled at approximately 30 days of storage for 2,000 mature dairy cows and 85 days of storage for 699 mature dairy cows. The effluent storage ponds will be filled at the end of the production period.
annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawaii’s Dairy Farms”: [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Coni Wesland
May 26, 2016

181 Pi'ipu Road, #422
Koloa, HI 96756

Subject: Hawai‘i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhā‘ulepū Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Coni Wesland:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the HDF site during the survey were identified and include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations.

In response to cattle-related insect pests, numerous species known to compete with predators and competitors to the horn fly were successfully established during that period. Cattle egrets break up dung patties while searching for prey, and were introduced to Hawai‘i in the late 1950s to control cattle-associated insects. Extensive introduction of dung beetle species resulted in 14 dung beetle species becoming established on Kaua‘i. A healthy population of dung beetles can bury a dung pat in one to three days, which disrupts reproduction of flies such as the stable fly and horn fly. The stable fly requires approximately 21 days within the dung patty for the immature life stage (egg to pupa) to survive; the horn fly takes 10 to 20 days from egg to adult. Incorporation of the manure into the soil profile by dung beetles removes the habitat these flies require to complete their lifecycle. Research shows that 95 percent fewer horn flies emerged from dung patties containing a dung beetle species that has been identified at the HDF site. Proven control methods for the stable fly include parasitic micro-wasps and spreading out manure.

A healthy population of dung beetles can bury a dung pat in one to three days, which disrupts reproduction of flies such as the stable fly and horn fly. The stable fly requires approximately 21 days within the dung patty for the immature life stage (egg to pupa) to survive; the horn fly takes 10 to 20 days from egg to adult. Incorporation of the manure into the soil profile by dung beetles removes the habitat these flies require to complete their lifecycle. Research shows that 95 percent fewer horn flies emerged from dung patties containing a dung beetle species that has been identified at the HDF site. Proven control methods for the stable fly include parasitic micro-wasps and spreading out manure.

Among the invertebrates previously introduced to Hawai‘i to combat livestock-related flies are extremely tiny parasitic wasps that prey on various fly species. The adult wasps could be described as the size of gnats. Using an ovipositor – described by lay people as a “stinger” – the female lays eggs in the larvae or pupa of flies. The...
male wasp has no such "stinger". See Draft EIS Section 4.11 for a photo providing scale for these tiny, non-stinging wasps.

To minimize potential establishment of pest flies or other insects, food waste generated during the construction phase will be bagged, covered, contained and disposed of in order to limit possible breeding habitat for flies. Inspections of building materials for ants or other insects will be conducted to prevent introduction of new pests to the HDF site. Short-term controls, including mechanical methods (e.g. sticky tapes or ribbons in the milking parlor, or traps with or without attractants) and chemical methods may be used to prevent short-term spikes in pest populations.

Insecticides and herbicides are non-discriminatory and kill beneficial as well as pest insects. Beneficial insects include primary decomposers such as earthworms and dung beetles, and pollinators including bees. Should chemical control be needed for short-term spikes in pest populations, application would be by those qualified, and in accordance with regulatory labeling requirements. HDF will implement long-term integrated pest management, which utilizes knowledge of the ancient food web among species by disrupting the manure habitat required to complete the fly life cycle. HDF and other ranchers on Kaua‘i may choose to engage with the State Department of Agriculture to translocation dung beetle species already introduced on Kaua‘i to Māhā‘ulepū and other areas where manure-related flies may be a problem.

IMPACT OF SPRAYS ON BEES

Beneficial insects include primary decomposers such as earthworms and dung beetles, and pollinators including bees. Honey bees are an essential part of any agricultural ecosystem, and were observed on site during the invertebrate species survey. Pesticides and herbicides can reduce populations of beneficial insects, which is why HDF will utilize an integrated pest management approach.

It is expected that honey bees will visit water sources set up for the HDF herd. Preventative measures will be built into any open water source to prevent bees from being trapped, and HDF will contact local beekeepers for advice regarding any bees or bee colonies encountered on site. Safe application practices for any unavoidable herbicide or pesticide will be utilized in order to narrowly target the correct pest species without harming other insects and animals in the area. Anyone using herbicides or pesticides will be properly trained and informed, and if a honey bee colony location appears to be a danger to workers or cattle, or to be in danger itself, a local beekeeper will be contacted for advice and removal.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 in O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $150,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents,
nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawaii Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16.4, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

**Hydrology:** The area's hydrology is shaped by its geology. The Kūloa area was built by Napali formation lavas of the Waimānālo series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Sapoākite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kūloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kūloa-Po'ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāulepū 14 well and the County’s Kūloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāulepū Valley, HDF established a 1,000-foot setback surrounding the Kūloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kūloa-Po’ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,500 residents by 2030. The South Kaua‘i population is estimated to reach 16,555 in 2035, when it is projected to encompass 192 percent of the County population. For the South Kaua‘i region (the Kūloa - Po'ipū - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**
Resource Management has established surface water hydrologic units for managing Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices in accordance with best management practices.

Vegetative buffer strips that could capture particulates during stormwater runoff events. Another sediment control application of this within the pre-impact drainage networks, to create filter strips that could capture particulates during stormwater runoff events.

Conservation Service (NRCS). These practices include setbacks to reduce runoff that towards the south.

of drainageway (totaling 70-feet in width) to keep cows away from surface waters. This ditch, named Waipio Ditch, is joined by a reach from the eastern boundary, which runs from the ridge towards the Honolulu District. These normally dry streams converge into a small, confined waterway running in accordance with best management practices.

Conservation Service (NRCS). These practices include setbacks to reduce runoff that towards the south.

The HDF site is located on the bottom of the upper Waipio Valley, which is on the upland area of the project site and adjacent to the lower Waipio Valley. The site is located within the Waipio Valley, which is part of the Kaheolu watershed. The site is located within the Waipio Valley, which is part of the Kaheolu watershed. The site is located within the Waipio Valley, which is part of the Kaheolu watershed.

The groundwater and surface water analysis conducted for the Environmental Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator concentrations. The contamination of the water is due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium into surface waters in the alluvium. Groundwater can discharge from the alluvium into surface waters in the alluvium. Groundwater can discharge from the alluvium into surface waters in the alluvium. Groundwater can discharge from the alluvium into surface waters in the alluvium. Groundwater can discharge from the alluvium into surface waters in the alluvium.
inches. Such rainfall events are estimated to occur approximately three percent of
days, or an average of 10 days annually. Per best practices, no effluent application
would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Poʻipū region were
also calculated. Nitrogen input to the marine environment in the Poʻipū region is
calculated to be 38,510 pounds annually, or 3.5 times more than the estimate
of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater
and landscape fertilization in the region is estimated to be 1,260 pounds annually,
or 1.4 times greater than the potential discharge from HDF. The nutrient inputs
from domestic uses in the Poʻipū region are constant throughout the year and no
mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and
surface water interaction with the marine water downgradient from the dairy site
was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the
Waiōpili Ditch provides the majority of freshwater input in the immediate coastal
area. Water chemistry measurements made by MRCI identified mixing of ditch
water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just
10 days annually from dairy operations will not adversely affect ocean water quality
and the marine environment. The nearshore area is a highly mixed environment
which actively disperses inputs within several meters from shore. Comparing
nutrient constituents in surface water samples taken from the HDF site and the
agricultural ditches down gradient to nutrients sampled in the nearshore ocean
water revealed that indicator bacteria were substantially lower in the ocean than in
ditch. The rapid decrease is likely a result of both physical mixing of water
masses and toxicity from saline water. In any event, the elevated levels of indicator
bacteria do not extend beyond the shoreline. Baseline water quality data and
the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality
monitoring will be instituted in conjunction with the surface water quality
monitoring to regularly sample and analyze the nearshore ocean waters. The
ongoing testing program will provide feedback to the dairy management team to
help ensure that nutrients and bacteriological constituents are not being released at
levels of environmental concern. Data from the nearshore water monitoring
program will be shared with the DOH CWB, dairy neighbors and the local Kauaʻi
community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air
quality conditions and project impacts were evaluated, including dust and odor.
Potential odors and emission levels for air pollutants relevant to dairy operations
were modeled, as currently there are no cows on site. ER sections 4.19 and 4.25
provide an evaluation of air quality and odors, including a windrose depicting wind
speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality
technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S.
Environmental Protection Agency (EPA) regulates both large and small sources of
air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for
six criteria pollutants. The State of Hawai’i has established its own State Ambient Air
Quality Standards (SAAQS) that are as strict or, in some cases more strict than the
NAAQS. State standards prohibit any visible emissions of fugitive dust from
construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive
dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric
fermentation, and both methane and nitrous oxide (N₂O) emissions from manure
application. No State or Federal regulations for greenhouse gas emissions from farm
operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect
the paddocks and lead to and from the milking parlor. Potential fugitive dust
emissions were estimated from published literature, where particulate matter
(PM) is measurable from the “drylots” of confined dairy operations where animals
walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates
potential emission resulting from HDF. Cows in the pastoral rotational-grazing
system will be on pasture 22 hours each day and will spend two hours – in two
separate milking cycles – moving to and from the barn for the 10- to 15-minute
milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to
the size of the non-pasture areas used by cows at HDF. Results were added to the
background concentration of particulate matter (both PM₁₀ and PM₂·⁵) measured on
the island of Kauaʻi, and the total concentration was compared to the State ambient
air quality standards. Only the contemplated herd size of up to 2,000 mature dairy
cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust
impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³,
well below the State standard of 150 μg/m³. The estimated concentration for PM₂·⁵
is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section
4.19 and Table 4-192).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of
organic matter in manure. No animals or dairy facilities currently exist in the area
leased by HDF, so air dispersion models were used to determine potential odor
levels. Local weather data was used in conjunction with the AERMOD modeling
system, and published rates for manure odors emissions for dairy heifers and
effluent ponds were adapted to reflect the HDF facilities.
Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year; within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawaii Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Allan B. White:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the size of 699, HDF will contemplate the possibility of expanding the herd in the future. HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob”s, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary resource of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 25, 2016, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob”s, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the...
Allan B. White  
May 26, 2016  
Page 4 of 6

energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage. The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word "nutrients." Where waste is utilized as a resource, it is being used for the constituent components that provide benefit. The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to the ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā‘ulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd, heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow.

For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows being treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as BST or rBGH.

ALTERNATIVES: As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conversion of the storage pond to a water treatment pond. The alternatives are examined and eliminated from further analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternative findings were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.
The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua'i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai'i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).

- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua'i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.

- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai'i Dairy Farms was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai'i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai'i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

- The planned action will generate new long-term employment in the agricultural sector on Kaua'i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).

- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai'i Dairy Farms”:

http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
An Environmental Impact Statement (EIS) is being prepared voluntarily by the Applicant to assess potential environmental impacts and mitigation measures associated with agricultural operations at Hawai‘i Dairy Farms (HDF) at Māhā‘ulepū, Kaua‘i.

To assist in preparing the EIS, an Environmental Impact Statement Preparation Notice (EISPON) was recently published. A 30-day public comment period on the EISPON ends February 23, 2015. The purposes of the publication and comment period are two-fold:

1. to allow individuals and groups to request to become a consulted party; and
2. to provide written comments regarding effects of the proposed action.

NOTE: Submitted comments will be published in the Draft EIS

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**COMMENT**

**Name:** BILL WHITNEY  
**Organization:** SELF  
**Preferred contact Method**

**Email:** wmyrlwhitney@gmail.com  
**Postal Address:** 1970 WAIANO RD  
KAPAA, HI 96746

**Comments:**

- Will another EIS be required if you exceed 699 cows?
- Will the EIS include a section on impact, pro or con, to the south shore tourist industry — jobs, financial, environment?
- How will a catastrophic system failure to the environment be mitigated?
- Is the former dairy site near Kilauea an "alternative dairy location"?
- I would like to comment on the Feb 19th presentation. The presentation at the Koloa school was really well done. A very nice format.

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**Return to:**

Group 70 International, Inc.  
925 Bethel Street, 5th Floor  
Attn: HDF Project  
Honolulu, HI 96813  
hdf@group70intl.com

**And/or:**

Hawaii State Department of Health  
Environmental Planning Office  
919 Ala Moana Boulevard, Rm. 312  
Honolulu, HI 96814  
epo@doh.hawaii.gov

**Deadline:** February 23, 2015
The Environmental Impact Statement (EIS) Preparation Notice (EISP), published January 23, 2015, described the proposed pasture-based rotational grazing system as a "zero-discharge, grass-fed dairy". The term "zero-discharge" under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term "grass-fed" was used in the HDF EISP. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of "grass-fed", the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient "dry matter" grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāʻulepū site on Kauaʻi have been conducted for more than 10 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “nobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the
energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility: surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waia Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai’i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the dairy application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioning to pasture at HDF before transfer to the ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā‘ulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd. Heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

DEMOGRAPHIC AND ECONOMIC: The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plash Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai’i Island), approximately 10 percent of Hawai’i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.
HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. The dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**ALTERNATIVES:** As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis.

These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).
The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3). However, after years of trying, it appears there was limited interest in such a venture.

Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand reducing dependence on imported milk (Objective 1).  
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability and accessibility (Criterion 1).  
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).  
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).  
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.  
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).
To whom it may concern:

This is a comment about the Draft EIS for the Hawaii Dairy Farms planned dairy in Maha'ulepu.

I am a trained economist with a focus on natural resources management. I have lived on Kaua‘i for about five years and have been coming here for 14 years, typically staying on the south shore.

My suggestions for what the EIS should examine include:

--waste management
--potential for waste run off and how it will be controlled
--potential for contaminating water supplies, especially the municipal wells in close proximity to the site
--air quality protection

--potential for nuisance flies or any other manure-related pests and how they will be controlled

Thank you.

Respectfully,
Susan Wiener

May 26, 2016

Susan Wiener energysavant@yahoo.com

Subject: Hawai‘i Dairy Farms Environmental Impact Statement Preparation Notice Māhā‘ulepū Road
Kaua‘i, Hawai‘i

Dear Susan Wiener:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPAN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S.
Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 35, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā‘ulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mobs”, mimicking the natural social order of hordes. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways, and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waiau Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or dilution effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management, see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected to last at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhā‘ulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhā‘ulepū site applies to mature dairy cows.
Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a heifer/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kūloa area was built by Napali formation lavas of the Waimena volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kūloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kūloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water-quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kūloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kūloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.
Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū - Kalihea districts), water use in 2035 is projected to be 324 MG/D, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; geotextile fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands. Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under "Library" (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates and nutrients during storm events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 670 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in deficit and require commercial supplementation. Grass yields are anticipated to...
increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhā‘ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Pōpūpi region were also calculated. Nitrogen input to the marine environment in the Pōpūpi region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pōpūpi region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downstream from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the
background concentration of particulate matter (both PM$_{10}$ and PM$_{2.5}$) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM$_{10}$ is 2.01 μg/m$^3$, well below the State standard of 150 μg/m$^3$. The estimated concentration for PM$_{2.5}$ is 0.23 μg/m$^3$, well below the Federal standard of 35 μg/m$^3$ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odor emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per yeat, within an area that extends approximately 1,670 feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawai‘i Dairy Farms": http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Hawai‘i Dairy Farms, Environmental Impact Statement Comment

By Mark Wilcox, 2640 Puuholo Road, Koloa, HI 96756

The other day, I heard an old song on my car radio. The refrain went like this:

Don't it always seem to go
That you don't know what you've got
Till it's gone.

They paved paradise
And put up a parking lot.

I fear that this kind of paradise destruction is in store for Kaua‘i’s lovely Maha‘ulepu Valley. Except instead of asphalt, the land will be paved in manure—cow manure.

Using Hawai‘i Dairy Farms’ (HDF) own figures, one cow will produce 143 pounds of manure each day. That’s daily! With a projected herd of 2000 cows, that is 143 TONS of manure every single day!

This makes me think of the cattle factory farms I pass by on I-80 in Nebraska. The stench cloud from the cow manure there is horrific to drive into and through. The airborne hydrogen sulfide/ammonia gas combination stings the eyes and assaults the nose. This is what HDF plans to foist onto the South Shore and release into our trade winds? Downwind Po‘ipu and Koloa will be devastated. Residents will gag, and the stench will chase visitors and vacationers out of Po‘ipu and most likely off Kaua‘i. The South Shore will experience vacant rooms, shuttered tourism-related businesses, collapsing real estate prices, job losses, bankruptcies, and foreclosures. Locals will be unable to sell their homes because no one will want to buy a house or condo in Koloa or in Po‘ipu as long as an industrial dairy farm operates “next door.”

As a young boy I was taught that I was basically free to do anything I wanted as long as it did not touch someone else’s nose.” HDF’s proposed factory farm will be “touching my nose” in a most nauseating manner. HDF needs to move to another location—a location where the smell of manure will not assault resident and visitor senses.

And don’t get me started on percolation rates, clay soils, run-off, flies, ocean pollution, seal and whale endangerment, e-coli bacteria, well contamination, ....
often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.1. The project location does not provide any habitat for *Drosophila* maruhalae, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native *Drosophila* habitat is located many miles away in the high elevation koa-‘ōhi‘a forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawai‘i for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1898 and 1950 to reduce livestock-related insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhā‘ulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure padds. The behavioral diversity among dung beetle species will work together to bury dung pats in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōkō-Po‘ipū region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Aha Kimoiki Road between Kōkō and Po‘ipū, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animals wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State employment multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $69,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 4.4 million gallons (36,719,780 pounds) of milk will be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $160,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.
WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawaii Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimāna volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāʻulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black algal clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move through the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further details.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Poipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Poipū - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface...
Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received low stream discharge. There are confirmation of exemption for maintenance of existing drainage ditches from the National Pollutant Discharge Elimination System (NPDES) – Construction only irrigation water will be used in these areas as needed to maintain the vegetated turf. Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The nutrient fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture in key locations; sand bags barriers in swales; and geotextile filter fabric and grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy permit prompted CWB to conduct a "Sanitary Survey" of the Maui Valley Dairy. The Biological Reserve in April of 2014. The group reported high levels of enterococcus to the National Park Service (NPS) – and the Department of Health (DOH) and provided its data. However, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling of either effluents in the recreation waters at the terminus of Waiopili Ditch, or of surface waters in the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could increase more than three tons DM per acre with daily establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statements (EIS) revealed that the natural fecal coliform density at the site is insufficient to meet the agronomic need of the pasture in key locations; sand bags barriers in swales; and geotextile filter fabric and grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

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To provide perspective, nutrient inputs from the adjacent Kiloa-Po'ipu region were also calculated. Nitrogen input to the marine environment in the Po'ipu region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipu region are constant throughout the year and no mitigation is applied to reduce the quantities.

Effects to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipiohi Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient concentrations in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua'i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EB sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai'i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drybids" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured in the island of Kaua'i and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF; so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing dilute nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were
applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

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This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OGE website at the following URL, search "Hawai’i Dairy Farms": http://timeurl.com/08O3A9I

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, ACP, LEED AP
Principal Planner

February 23, 2015

Via Certified Mail, Return Receipt Requested:

Laura McIntyre
State of Hawai’i
Department of Health
1250 Punchbowl Street
Honolulu, HI 96813

Group 70 International, Inc.
925 Bethel Street, 5th Floor
Honolulu, HI 96813

Jeff Overton
Hawai’i Dairy Farms, LLC
PO Box 1690
Koloa, HI 96756-1690

Also via e-mail to: HDF@Group70int.com
laura.mcintyre@doh.hawaii.gov

RE: Environmental Impact Statement

Dear Ms. McIntyre:

This letter is in response to Hawai’i Dairy Farms request for comments on their Environmental Impact Statement. Although I attended the meeting on February 19th at the Koloa School cafeteria, my concerns were not specifically addressed in any of the focus groups. Therefore, I am taking this official opportunity to voice my concerns and request that specific needs and issues for the communities of Po’ipu and Koloa be addressed.

While I have issues with all of the Significant Criteria listed on page 23 (approximate since no page numbers are listed) of Hawai’i Dairy Farms Environmental Impact Statement Preparation Notice, my comments in this document will specifically refer to 4.1.4 as follows:

4. Substantially affects the economic or social welfare of the community or State;

SOCIAL WELFARE

Quality of life issues related to the structure and scale of agriculture have been examined since the 1930s. It is widely recognized in the literature that the social fabric or social capital of communities undergoes significant change as industrialization of agriculture takes place. In general, communities with greater social capital or social fabric provide greater quality of life. This social fabric of communities undergoes significant change as the industrialization of agriculture takes place.
Research reveals specific examples of how CAFOs disrupt social capital:

- Increases in crime rate and civil suits
- Increase in local police
- Increased stress and social psychological problems
- Detrimental relationships between farmers and their neighbors
- More stressful, less neighborly relations
- Decline in community services, leaving an area with fewer/ poorer quality public services.
- Negative assessment of trust, neighborhood, networks of acquaintance, democratic values, and community involvement.

Several of the above points are already happening in the Po'ipu community!

A six-county study in southern Minnesota reported three patterns that typically reflect the decline of social capital resulting from the siting of CAFOs in all six rural counties:

1. Widening gaps between the farmers who produce livestock within CAFOs and their neighbors, including non-CAFO livestock producers;
2. Harassment of vocal opponents of CAFOs; and
3. Perceptions by both CAFO supporters and opponents of hostility, neglect, or inattention by public institutions that resulted in perpetuation of an adversarial and inequitable community climate.

Again, #2 and #3 are already occurring in the Po'ipu community.

One of the most significant social impacts of CAFOs is the disruption of the quality of life for neighboring residents. More than an unpleasant odor, the smell has dramatic consequences for communities, like Kauai, where lives revolve around enjoying the outdoors. Large-scale livestock facilities near homes significantly disrupt community living. Highly cherished values of freedom and independence associated with life oriented toward the outdoors give way to feelings of violation and infringement. Social gatherings where family and friends come together are affected either in practice or by disruption of routines that normally provide a sense of belonging and identity—backyard barbecues, luaus, and visits by friends and family, for example. Homes are no longer an extension of, or a means for, enjoying the outdoors. Rather, homes become a barrier against an outdoors that must be escaped.

Conflicts emanating from CAFOs polarize residents and tear at the fabric of community life, transforming neighbors into enemies, and severely straining friendships and family relationships. In addition, because local activism depends on the mobilization of volunteered efforts and resources, it demands an obsessive identification with “the cause.” This contrasts with the purchased human resources and expertise available to Hawaii Dairy Farms. Not only does this obsession rigidly define “sides” within a small population, but it can also result in the physical and mental exhaustion of heavily committed residents and the deterioration of communities.

ECONOMICS

Income

Fifty years of studies demonstrate that the encroachment of CAFOs upon communities results in lower relative incomes for certain segments and greater income inequality and poverty, a less active Main Street, decreased retail trade, and fewer stores in the community. Farms with a gross income of $100,000 make nearly 95% of their expenditures locally, while farms with gross incomes in excess of $500,000 spent less than 20% locally. This means that most dollars made by the CAFO do not stay in the community and help it to thrive, but instead leave the community, draining it economically.

Employment

Often, CAFOs are touted as increasing employment within the rural communities they are near. However, the emphasis on efficiency of CAFO operations, relying heavily on technology rather than labor, actually leads to higher unemployment rates in those communities. On the rare occasion that such growth is realized, the growth is usually not strong enough to reverse out-migration that could be attributed to the CAFO. There is no multiplier effect of dollars being spent locally when large corporate-owned CAFOs are built in a community.

Decreased Property Values

Industrialization of animal agriculture leads to the reduced enjoyment of property and deterioration of the surrounding landscape, reflecting in declining home values and lowering of property tax assessments. Proximity to confined animal feeding operations is the reason property tax assessments have been lowered in eight states. CAFOs can generate flies, odors, and other externalities that decrease land values near facilities. These risks also depress property values in communities near CAFOs. An assessment in Missouri estimated that property values near CAFOs had fallen a total of about $26 billion.

CONCLUSION

When the economic and social benefits of industrialized livestock production are compared to other alternative uses of land and water resources, typically the alternatives are more beneficial. The positive economic, social, and human development impacts of CAFOs are, at best, modest.

Based on scientific literature and decades of studies supporting all of the above concerns, I request that HDF research and produce a financial report objectively outlining all economic benefits and deficiencies stated in this letter that will affect the communities of Koloa and Po'ipu (short and long-term), if a CAFO is sited at 'Aha'ula Valley.

Hawaii Dairy Farms is proposing to take much away from the communities of Koloa and Po'ipu, which is not rightfully theirs to remove. I request that an official document be constructed outlining and benchmarking how Hawaii Dairy Farms will rectify the damaged
Dear Kelly Wildman:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā‘ulepū Valley on the island of Kaua‘i. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system.
as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISP. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herds’ diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāʻulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “mob”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waialae Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflected in the title of the livestock waste guidance for Hawai‘i is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit.

The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of
699 mature dairy cows at the Māhāʻulepū site applies to mature mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herd’s welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

**DEMOGRAPHIC AND ECONOMIC:** The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS), including a fiscal impact assessment report completed in April, 2016 by Plasch Economics Pacific. Draft EIS Section 4.15 addresses demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, metal workers, carpenters, plumbers, electricians, roofers, supervisors, painters, etc. Based on State examples, multipliers, indirect employment related to Dairy construction would be expected to average about 16 jobs on Kaua‘i, and 8 on O‘ahu. Construction employment would be expected to average about 12 jobs per year during the development period. Thus direct-plus-indirect employment association with construction would be expected to average approximately 36 jobs, of which 28 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, will increase the supply of local fluid milk by approximately 1.2 million gallons of milk annually, a 50 percent increase in statewide milk production. On-going dairy operations at the committed herd size will provide approximately 16 direct and indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11 indirect jobs. An additional 6 indirect jobs related to on-going dairy operations would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. When the dairy has matured to full production for the 699 cow dairy, net income to the State is calculated at $160,000 annually. With the potential contemplated herd size of up to 2,000 mature dairy cows, approximately 44 million gallons (36,719,780 pounds) of milk would be produced. This would double local milk production currently supplied by operational dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd is estimated at approximately 3 construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a total increase of 9 jobs. For on-going operations at the contemplated herd size, an additional 5 full-time farm jobs would be added, with approximately 15 additional indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the committed herd size). The State will derive approximately $360,000 annually in revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated nuisances that could affect property values as a result of dairy implementation or operations. No noticeable odors, flies, noise, waste or water discharges will impact resort or residential areas. As such, the dairy will not adversely affect residents, nearby recreational activities, guests in nearby resorts, or diminish property sales or property values in the area.

**ALTERNATIVES:** As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

The DEIS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed action. Additionally, reasonable land use alternatives that emerged from public input during the project scoping phase are documented and briefly discussed. The alternatives that do not meet the project purpose are not advanced for analysis of environmental benefits, costs, and risks. The Environmental Impact Statement Rules, Hawai‘i Administrative Rules Chapter 11-200 (HRS 11-200) requires a discussion of alternatives that could attain the objectives of the action, regardless of cost. There is no requirement for the alternatives analysis to consider every possible land use.

Four possible land uses that would not meet the project purpose are discussed. Rezoning the land for resort or residential development, or a potential conservation condemnation are two uses that were examined and eliminated from analysis. These options would not be reasonably viable given the existing private land tenure and existing zoning. Two additional alternatives were considered as reasonable land...
uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3) and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).

- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions and accessibility (Criterion 1).

- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soils science, environmental resources management (Criterion 2).

- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities (Criterion 3). However, after years of trying, it appears there was limited success in such a venture.

- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).

- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).

- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soils science, veterinary and animal husbandry, environmental resources management, milk/milk processing and dairy business management (Criterion 2).

- Sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).

- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawaii Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

February 21, 2015

State Of Hawaii
Department of Health
1250 Punchbowl Street
Honolulu, HI 96813

Group 70 International, Inc.
925 Bethel Street
5th Floor
Honolulu, HI 96813

Hawaii Dairy Farms, LLC.
P.O.Box 3690
Koloa, HI 96756-1090

To whom it may concern:

I would like to register my comments on the Scope of the Environmental Impact Statement (EIS) concerning the proposed industrial dairy at Maha'ulepu, Kauai. I understand that after describing my concerns, I will be allowed to continue in the EIS process and be assured the ability to provide future comments. I am concerned with all 13 Categories of Significance Criteria identified in the HAR Chapter 200, but I would like to concentrate my comments on Criteria 7, 10, and 11. My concerns revolve primarily around the environmental issues involved with Hawaii Dairy Farms (HDF) planned industrial dairy operation.

Although I am not a resident of Hawaii, I have spent annual vacations on Kauai for the past 16 years. To provide an understanding of my background, I attended the University of Hawaii – Manoa in 1974, received a bachelor's degree at Drake University and a Masters Degree in Water Resources Management at the University of Wisconsin – Madison. The emphasis of my Masters work was on Water Quality planning in association with dairy farms in southern Wisconsin. I am quite familiar with dairies and their impact on streams and the environment. For the last 30 years, I have been on the faculty at Oregon State University as a fish biologist and stream ecologist.

It will be impossible for HDF's large scale dairy operation to be a "Zero-point source discharge, meaning 100 percent of the cow's manure will remain on the farm as fertilizer for the pasture grass" as stated in the HDF Environmental Impact Statement Preparation Notice.

Kauai receives some of the greatest amounts of rainfall anywhere on earth. Even the dryer south side of the island can receive large quantities of rain within a 24 hour interval. In addition, long intervals of 10 to 20 consecutive days can receive moderate to heavy rainfall. Incidents of heavy rain for the Maha'ulepu area can be observed by using rainfall records from the nearby rain gauge. Rainfall records from the weather gauge at Po'ipu/Maha'ulepu indicate that, in the past 5 years, there have been numerous rain events within a 24 hour interval which have exceeded 2 inches.
Below is a summary of my concerns with HDF's planned industrial dairy operation at Maha‘ulepu:

**SOILS**

In the document entitled “NRCS Conservation Service Plan” prepared by HOF, it indicates that the soils at the site are volcanic in origin and would be readily absorbed runoff. For this dairy to operate at a zero-point source level, soils would need to be favorable for nutrient absorption. However, recent documents from HOF indicate that the soils at the site are not porous volcanic soils but are, instead, poorly drained day like soils. Soils at the site now have been indicated as being Ka‘ena clay and Kaliihi clay. These soils are not porous and will lead to overland flow of rainfall and applied diluted effluent by irrigation. The draft EIS will need to address, in detail, the extent of these poorly draining soils and their proximity to Waiopili Stream as well as Mill Ditch and all other ditches that have flowing water within the dairy operation.

**BUFFER STRIPS**

After studying the environmental impacts from dairy operations for my Masters degree at Wisconsin, “America’s Dairyland”, a common practice for limiting runoff from dairy operations into surface water is with the use of buffer strips. Buffer strips of well vegetated zones consisting of grass and shrubs/trees along the sides of a stream can act to limit, and even absorb, nutrient runoff from nearby dairy operations. Typically, buffer widths of 200 feet are implemented if downstream uses of water are for recreation, drinking water, or if endangered species inhabit stream waters. If none of these issues exist, then buffer strips of 100 feet can be used, but the ability of nutrient absorption is reduced. The downstream reaches of Waiopili Stream, specifically the area where the stream enters the ocean at Gillin’s Beach, is used extensively by visitors and residents alike for recreation.

HDF’s plan indicates a buffer strip of 50 feet for streams, agricultural water and natural water resources. Fifty feet of riparian buffer will be inadequate to stop manure from entering surface waters. Waiopili Stream will receive dairy effluent during storm events and will transport the material to the ocean at Gillin’s Beach. Over the years, I have witnessed and documented numerous events where the ocean is brown with runoff materials at Maha‘ulepu. This runoff is partially coming from the low levels of cattle grazing already operating in the area. Even with this existing low level of grazing, Waiopili stream is providing large amounts of sediment to the ocean and is limiting the recovery of corals in the area.

Water quality monitoring by both Hawaii Department of Health and by Kauai Surfrider indicate high levels of E. coli in Waiopili Stream as well as in the ocean directly out from Gillin Beach. With the levels of E. coli presently being the highest of all streams on Kauai, there is a responsibility of the state to limit development in the area so that these already high levels of E. coli do not continue to increase.

In HDF’s EIS Preparation Notice, they state in the section labeled Surface Water Resources, the “Area has a system of ditches (‘auwai).” Furthermore they state “Several ditches exist between these north-south running ditches to drain the fields. Mill ditch forms the southern boundary of the parcel, which flows into Waiopili Stream and then discharges to the ocean at Maha‘ulepu Beach.” If these ditches “Drain the fields” as stated in the Notice and enter the stream ecosystem, they will eventually end up into the marine environment. This is definitely not a “zero-discharge system”. A thorough and detailed examination of the likelihood of nutrients entering the freshwater ditches and streams of the area will need to be addressed in the prepared EIS.

Furthermore HDF’s Preparation Notice, Section 3.3 INFRASTRUCTURE, subsection Drainage and Storm Water Runoff, gives more details about the ditch system by stating: “The project has been used for previous agricultural and grazing activities, and has a system of ditches to channel storm water through the area as well as to drain the fields”. Draining the fields where grazing cows are defecating/urinating is EXACTLY what is to be avoided. The EIS will need to document, in detail, how storm waters will be managed and how they will be prevented from entering surface waters systems.

A secondary route where urine/manure can enter the freshwater ecosystem is through the aerial application of diluted effluent onto the pastures. Spray drift is a common problem and wind conditions are critical factors for proper application of effluent upon these systems. Literature that HDF has provided does not indicate what the maximum threshold wind spread limit is when the irrigation of effluent is terminated. Will the effluent be irrigated if the typical trade winds are prevailing? After several years of preparation work at the site, HDF must realize that strong winds are common. Winds will carry the aerial application of effluent past intended pastures and into areas such as ditches, streams, and riparian buffer zones. How will the wind speed be determined at the site? Will wind speeds be measured by the use of anemometers and how many units will be located at the site? Where will anemometers be placed? How often will wind speed levels be measured? Who will be measuring the wind speed or will it be done automatically? Are aerial applications of the effluent through irrigation done day and night? All of these factors will need to be addressed in the prepared EIS.

When effluent enters the ditch system, either by overland flow or by spray drift from aerial effluent application, what will be the protocols for documenting the oversight? Will there be a system in place to filter the fresh water ditch system of contaminants? Who will be monitoring the water quality in the ditch system and in Waiopili Stream? How often will water quality be monitored in these surface waters?

During heavy or prolonged rainfall events contaminated waters will flow through the ditch system, including Mill ditch, and into Waiopili Stream and eventually into the ocean. There are numerous species, endemic and endangered within the freshwater system that will be affected. The following are some, but not all, of the freshwater species that will be affected and thus will need to be addressed within the EIS.

**Waterfowl:**

There are five waterfowl species presently listed as endangered by the IUCN (International Union for the Conservation of Nature). This organization is the world’s main authority on the conservation status of sensitive species. Species known to be present at the proposed dairy site are:

- Hawaiian Duck (Anas wyvilliana)
- Hawaiian Goose (Branta sandvicensis)
Hawaiian coot (Fulica americana alb)  
Hawaiian stilts (Himantopus mexicanus knudseni)  

I have witnessed and photographed the Hawaiian duck feeding and loafing in Waiopili Stream near its junction with the ocean at Malaekahana beach. This species, along with the other four species, would be adversely affected if the water quality of Waiopili stream becomes more degraded than its present level. The EIS preparation will need qualified personnel to conduct rigorous surveys detailing the level of use by these five endangered birds known to occupy the area.

**AQUATIC INVERTEBRATES:**

There is nothing indicated in the Preparation Notice concerning aquatic invertebrate surveys. A survey of aquatic invertebrates will need to be conducted in order to understand the possible impacts from the proposed dairy on these organisms. The five listed bird species in the area all feed on aquatic invertebrates such as Odonata and Diptera. Understandably, terrestrial arthropods need to be surveyed but aquatic invertebrates should not be overlooked as important organisms that will be affected by changes in stream water quality. There are 23 species and subspecies of damselflies that are endemic to the Hawaiian Islands along with 5 endemic dragonfly species. Have surveys been conducted for the presence of the endangered Pacific Hawaiian damselfly (Megapodagrion pacificum) at this proposed site? The EIS will need to document if any of these endemic or endangered organisms are present in Waiopili Stream or any other waters running through the proposed site.

**FISH:**

There is nothing stated in the EIS Preparation Notice concerning the presence of fresh water fish in Waiopili Stream. I have observed fish in this stream on numerous occasions. Without the necessary permits and collecting gear (backpack electrofisher, seine) I do not know the species of these observed fish. Since Mill Ditch is fairly large in size and with perennial flow, I would postulate that it too has a native fish community. No information is provided on how the native fish community will be affected with this proposed industrial dairy.

Kauai has five freshwater endemic fish species. All are anadromous, with the adults living and spawning in streams but hatching larvae drift downstream to the ocean to live part of their life cycle. The five species of freshwater fish are:

- Strangulated flagtail (Kuhia xenura)  
- Hawaiian freshwater goby - Oupu alarmoo (Lentipes concolor)  
- O'pu ranaka (Stenogobius hawaiiensis)  
- Sandwich island sleeper (Eleotris sandvicensis)  
- Stimpson's gobli (Stictogaster stimpsoni)

Both *Stenogobius hawaiiensis* and *Eleotris sandvicensis* are endemic and are unable to pass steep torrents. These species may be present in the freshwaters of Waiopili Stream and the ditch system at the proposed dairy site. Fish surveys using backpack electrofishers and/or seines will need to be conducted for the EIS to determine their presence and abundance.

In section 4.2 HDF states that “Long-term effects to the environment are expected to be minimal”. I believe strongly that this statement is incorrect and there will be short and long term environmental damages from this industrial dairy operation. In addition to the effects on individual components of the ecosystem, there are obvious cumulative effects from this proposed dairy facility that would greatly alter the economy and environment of the Island of Kauai. Both freshwater and marine systems in the south shore area of Kauai would suffer substantially, tourism and the personnel employed by the tourism industry would be greatly altered and in all reality, HDF would be liable for such damages, from state and federal agencies, as well as from private individuals and corporations.

I truly hope an independent contractor would be preparing the EIS for this proposed dairy operation. Group 70 International, Inc., who has worked closely with HDF in the past, is preparing this EIS. This leads me to believe the document may be biased and the public and the State of Hawaii should not conclude that all statements in the EIS are based on sound science or objectivity.

Thank you for your time and please feel free to contact me if you have any questions. I look forward to following the process of this EIS.

Sincerely,

Randall Wildman  
Water Resources Management, MS  
3017 N.W. Alder Creek Drive  
Corvallis, OR 97330
Subject: Hawai'i Dairy Farms Environmental Impact Statement Preparation Notice

Māhūʻulepū Road
Kauaʻi, Hawaiʻi

TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Randall Wildman:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawaiʻi. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size EU99, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

GROUP 70 OBJECTIVITY: Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai‘i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai‘i Revised Statutes and the “Environmental Impact Statement Rules” (Chapter 200 of Title 11, Hawai‘i Administrative Rules). The environmental planning team at Group 70 has prepared several Environmental Assessment and EIS documents over the past 40 years, and every document has been accepted by the responsible County, State and Federal agency. On numerous past EIS projects, the Hawai‘i Chapter of the American Planning Association has recognized Group 70’s professional work with Chapter awards for excellence in environmental planning. Part of the EIS scoping process involves Group 70’s experienced team of technical sub consultants that are well-known and qualified in their respective fields of study. For this project, Group 70 is preparing the Hawai‘i Dairy Farms EIS with the level of analysis required to properly evaluate and disclose the existing environmental conditions, probable impacts with mitigation, and potential cumulative and secondary effects.

DAIRY OPERATIONS: Hawai‘i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhūʻulepū Valley on the island of Kaua‘i to produce fresh, locally available nutritious milk for Hawai‘i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy”. The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Consequently, the term “zero-discharge” was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed”. The USDA standard defines what animals can and cannot be fed. The Food Alliances project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.
The pastoral rotational-grazing dairy provides a local feedstock – grass – as the food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass and suitable sites to support sufficient management. See Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the percent of cows' diet. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels. The pasture-based model allows cows to move about freely, and to lie down and exercise while they forage. Cows spend 22% of their time lying down, feeding, and resting, mimicking the natural social order of bovines. Cows spend 22% of their time lying down, feeding, and resting, mimicking the natural social order of bovines.

Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will effectively produce quality milk. All cows will be treated with a high standard of health and hygiene practices, and antibiotics will be prescribed only when necessary. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH, as it is not approved for use in Hawaii. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH, as it is not approved for use in Hawaii.

Irrigation water management is a practice of managing the amount, rate, and distribution of irrigation water. The timing and application of nutrients will correspond with plant uptake, soil properties, and weather conditions. For more information on nutrient balance, refer to Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent. Irrigation water supply is provided to the farm from Waiakea Reservoir, and will be filtered and pumped to the various irrigation component on the farm. The NRS provides technical guidance on applying agricultural waste depending on the degree of contamination and environment. Irrigation water is used to improve and maintain water quality in agricultural activities, and to provide habitat for small microbranes to flourish and diversify to keep the ecosystem healthy. Two rounds of independent soil sampling were conducted in October 2011 and May 2012, and no detectable levels of milk were found to be in the soil. The background nutrient report is included as Appendix C of the Draft EIS.
In this way, “poorly drained” soils may represent less risk of nitrate and nitrite leaching to associated waterbodies than “well drained” soils (Yost, 2016).

As a result of reduced movement of water through the soil profile, the mobility of phosphorus and other nutrients through soils is decreased, and potential for lateral groundwater contamination is reduced. The NRCs soil classification scheme identifies three primary categories of soil reaction based on pH: acidic, intermediate, and alkaline. Intermediate soils have pH levels between 6.5 and 7.5, which is typically the optimal range for many plant species. Acids soils have pH levels below 6.5, and alkaline soils have pH levels above 7.5.

Another important factor in soil suitability is its ability to buffer changes in soil pH due to plant reactions. In general, soils high in organic matter are able to buffer changes in pH, whereas soils low in organic matter may experience significant changes in pH over time. This buffering capacity can help to maintain soil fertility and promote plant growth.

Soil fertility is also influenced by the amount of organic matter present in the soil. Organic matter is a major source of nutrients for plants, and its presence can significantly influence soil nutrient availability. Soil organic matter also plays a key role in soil structure and water infiltration, which can impact the availability of nutrients to plants. Therefore, understanding soil fertility and nutrient availability is crucial for developing effective soil management strategies.

In summary, soil moisture, pH, organic matter content, nutrient availability, soil structure, and water infiltration are all critical factors in determining the suitability of a soil for plant growth. By considering these factors, one can develop effective soil management strategies to optimize plant growth and promote sustainable land use.

**FLORA AND FAUNA:**

A botanical survey of the dairy property was conducted in August 2014 by the USDA-NRCS. This survey was conducted to assess the potential presence of endangered or threatened plants on the project site. The survey was focused on identifying any species listed as endangered, threatened, or proposed for listing under Federal or the State of Hawai‘i’s endangered species programs. The survey included a “Custom Soils Resource Report” for the island of Kaua‘i, which was prepared by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). This survey was conducted to identify any potential for impacts on soil resources, with technical studies in Appendix A and B.

A survey was also conducted for avian species as part of the Conservation Plan to reduce erosion and stabilize slopes. Where native plant species occur or could be planted, native plants will be used in the stabilization. The survey covered the dairy site area and immediate vicinity. Common bird species and terrestrial vertebrates occur or could survive if planted. Native plant species will be used in the stabilization. Poorly drained is not an indication of low or poor infiltration. Infiltration refers to the ability of water to enter the soil surface, whereas drainage refers to the movement of water within or from the soil profile. Poorly drained soil typically results in higher rates of leaching, whereas well-drained soils tend to have lower rates of leaching. This difference in leaching rates can have significant implications for nutrient availability and soil health.
mammals were encountered on the property. There is no critical habitat for endangered species in the upper Māhāulepuē Valley.

Four species of endangered waterbirds were recorded on the site and at the nearby taro farm located within the HDF site. Though the area does not provide critical habitat, seabirds that nest in upland areas of Kauai may overfly the site. The endangered Hawaiian goose, nēnē, was also seen on the site. State Division of Forestry and Wildlife biologists have noted nēnē are regularly seen on the subject property. It is probable that some nest on or adjacent to the site as this species nests in the general Kōloa area, and the habitat present on parts of the site is suitable for nēnē nesting.

The principal potential impacts posed to the five endangered species include those potentially associated with construction activities, and those associated with dairy farm operations following build-out. Measures will be adopted to avoid potential seabird and nēnē goose collisions with fences and structures. Potential measures include lowering construction cranes at night, using conservation fencing to project specified areas, marking tall structures and fencing with white visibility polytype, limiting nighttime lighting, and shading any outside lights used at night. Ongoing mitigation strategies will be implemented for day-to-day preventative measures, including an Avian Species Protection Plan. Mitigation measures are further described in DEIS Section 4.10.2.

It is also likely that Hawaiian hoary bats overfly the project area on a seasonal basis. While caution will be taken during any potential disturbance or vegetation removal, there are almost no suitable roost trees within the dairy site; thus it is expected that the dairy farm will not affect this listed mammalian species.

INVERTEBRATE SPECIES: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhāulepuē area, as well as the parasites and predators on site that control those species. Fieldwork was conducted during September 15-16, 2014. The entire study is included in Draft Environmental Impact Statement (EIS) as Appendix B.

CAVE AND LAVA TUBE INVERTEBRATES

There are no known caves or lava tubes found at or adjacent to the dairy farm property. The Kōloa Lava Tube System, which provides habitat for two endemic cave species, the Kaua‘i Cave Wolf Spider and the Kaua‘i Cave amphipod, is located several miles away from the dairy farm property. Both invertebrates are listed as endangered under the U.S. Endangered Species Act. Not all caves in the Kōloa area contain these invertebrates, as many do not contain the optimal climatological conditions required by these organisms. Neither the botanical and faunal survey nor the invertebrate survey revealed any evidence of lava tubes or caves on the property, and no such features have been reported for the area near the Hawai‘i Dairy Farms (HDF) site. Thus no cave invertebrate species will be affected by the dairy farm.

INTRODUCED PREDATOR INSECTS

An invertebrate study of manure-associated insects was conducted for the Draft EIS. The study included a field survey that used manure from an adjacent beef cattle herd as a lure, and determined flies and other manure-related insects currently present at the HDF site. Pest insects such as flies can negatively impact livestock health and production, and are therefore actively managed to prevent stress and loss of productivity at dairy operations.

At the HDF site, two common flies were identified: the stable fly and the horn fly. Both of these flies are widespread throughout the Hawaiian Islands. The greenbottle fly was reared from manure taken back to a laboratory following the field survey. Additionally, flies known to exist on Kaua‘i but not seen at the HDF site during the survey were identified and include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations.

In response to cattle-related insect pests, numerous species known to compete with the pests were introduced to Hawaii between 1898 and 1982. Twenty species of predators and competitors to the horn fly were successfully established during that period. Cattle egrets break up dung patties while searching for prey, and were introduced to Hawai‘i in the late 1950s to control cattle-associated insects. Extensive introduction of dung beetle species resulted in 14 dung beetle species becoming established on Kaua‘i.

A healthy population of dung beetles can bury a dung pat in one to three days, which disrupts reproduction of flies such as the stable fly and horn fly. The stable fly requires approximately 21 days within the dung patty for the immature life stage (egg to pupa) to survive; the horn fly takes 10 to 20 days from egg to adult. Incorporation of the manure into the soil profile by dung beetles removes the habitat these flies require to complete their lifecycle. Research shows that 95 percent fewer horn flies emerged from dung patties containing a dung beetle species that has been identified at the HDF site. Proven control methods for the stable fly include parasitic micro-wasps and spreading out manure.

Among the invertebrates previously introduced to Hawai‘i to combat livestock-related flies are extremely tiny parasitic wasps that prey on various fly species. The adult wasps could be described as the size of gnats. Using an ovipositor – described by lay people as a “stinger” – the female lays eggs in the larvae or pupa of flies. The male wasp has no such “stinger”. See Draft EIS Section 4.11 for a photo providing scale for these tiny, non-stinging wasps.

To minimize potential establishment of pest flies or other insects, food waste generated during the construction phase will be bagged, covered, contained and disposed of in order to limit possible breeding habitat for flies. Inspections of building materials for ants or other insects will be conducted to prevent introduction of new pests to the HDF site. Short-term controls, including mechanical methods (e.g. sticky tapes or ribbons in the milking parlor, or traps with or without attractants) and chemical methods may be used to prevent short-term spikes in pest populations.
Insecticides and herbicides are non-discriminatory and kill beneficial as well as pest insects. Beneficial insects include primary decomposers such as earthworms and dung beetles, and pollinators including bees. Should chemical control be needed for short-term spikes in pest populations, application would be by those qualified, and in accordance with regulatory labeling requirements. HDF will implement long-term integrated pest management, which utilizes knowledge of the ancient food web among species by disrupting the manure habitat required to complete the fly life cycle. HDF and other ranchers on Kaua‘i may choose to engage with the State Department of Agriculture to translocation dung beetle species already introduced on Kaua‘i to Māhāulepū and other areas where manure-related flies may be a problem.

**IMPACT OF SPRAYS ON BEES**

Beneficial insects include primary decomposers such as earthworms and dung beetles, and pollinators including bees. Honey bees are an essential part of any agricultural ecosystem, and were observed on site during the invertebrate species survey. Pesticides and herbicides can reduce populations of beneficial insects, which is why HDF will utilize an integrated pest management approach.

It is expected that honey bees will visit water sources set up for the HDF herd. Preventative measures will be built into any open water source to prevent bees from being trapped, and HDF will contact local beekeepers for advice regarding any bees or bee colonies encountered on site. Safe application practices for any unavoidable herbicide or pesticide will be utilized in order to narrowly target the correct pest species without harming other insects and animals in the area. Anyone using herbicides or pesticides will be properly trained and informed, and if a honey bee colony location appears to be a danger to workers or cattle, or to be in danger itself, a local beekeeper will be contacted for advice and removal.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
State of Hawaii
Department of Health
1250 Punchbowl Street
Honolulu, HI 96813

February 10, 2015

RECEIVED
FEB 23 2015
GROUP 70 INTL

Aloha, Fellow Lovers of our islands as they have always been,

I cannot speak to the environmental science of allowing a huge number of a huge bodied non-native species to be so close to the ocean. I cannot say what harms might be done to ground water or to the sea water. I do hope that whatever these problems might be, they are given proper thoughtful weight and the money involved is not any (even unconscious) determinant at all. I know that is difficult because rich people seem to have a gravity all their own and I know studies show that their jokes get laughed at longer and harder and they get smiled at more than the rest of us.

My family thinks such references to monevied folk are rude. That’s another advantage of being rich; people pretend not to notice.

My wife, children and I are long time visitors to Kaua’i since 1979 when we moved to the Po’ipu area (Spouting Horn Road) before I got into a boatbuilding school in Tacoma which I had been on a three years waiting list for and at that time moving back to the mainland.

We always stay in Po’ipu and frequently go to Maha’ulepu beaches when on the island and love them very much. I am reminded of our Forrest Park in Portland which is a haven within the city boundaries for those who want to be totally in Nature. We go there and are glad to drive very carefully on a deeply rutted road which we feel does not discourage visits so much as it slows us all down to the proper tempo, “island tempo”, we call it.

I fear the presence of the proposed dairy will impact our pleasure and reverence for this sacred area by introducing repulsive smells and inescapable awareness of the cow’s invasive bodily functions which we find all over our state of Oregon and where I came from in Virginia.

1) Unless there is a shortage of milk and 2) unless there is strong evidence children will suffer from its lack and 3) unless this very particular area is the only alternative, then I urge you to disapprove the siting of the proposed dairy in this special of all spots.

On the other side, all I can see is people who are used to getting their way no matter what others think and their, to me, mirky ambition to make impact with their lives. Surely profiting from the dairy does not amount to any blip of percentage of their total wealth—not even a rounding error, and their must be other factors at play. Those factors could be further and greater financial development of various kinds or could be just as inglorious as wanting others to have a(n olfactory) proof of their importance—a variation on what graffiti must mean for some of the street “artists” who present themselves to us by that means.

To me, sometimes in thinking hard about this very subject, I am taken to other considerations of anti-neighborliness such as I am aware of when I too often see broken glass at the base of sliding boards my grandchildren use at the public parks. (I mean it just has a certain strong and offensive reek to it which is not aloha...not pono.)

I appreciate deeply the important work you do in keeping all of us healthy and safe, and I wish you long and happy lives carrying out your great responsibilities bravely and, if needed, defiantly.

Yours very sincerely,

Bob and Jeanette Williams
3945 Willow Flat Rd.
Hood River, Oregon 97031
541-490-1600
541-490-1818
May 26, 2016

Bob and Jeanette Williams
39455 Willow Flat Road
Hood River, OR 97031

Subject: Hawai’i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhālulepū Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003:001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Bob and Jeanette Williams:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

Hydrology: The area’s hydrology is shaped by its geology. The Kūloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhāulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kūloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for the Draft EIS examined two groundwater bodies within the valley: (1) groundwater located in a deep aquifer within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kūloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydraulic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Pules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāulepū 14 well and the County’s Kūloa F well, will result in no adverse impacts to ongoing use of
Groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kīloa Fowell in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water Section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kō‘ola-Po‘ipu region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kō‘ola - Po‘ipu - Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**SURFACE WATER**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hā‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhā‘ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DH C Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to...
create filter strips that could capture particulates during stormwater runoff events.

Waiolilo Ditch provides the majority of freshwater input to the immediate coastal area. The ditch conveys water from the higher elevations of the mountain watershed to the coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water with seawater. Nutrients from surface water interaction with the marine water downgradient from the dairy site and the marine water do not extend beyond the shoreline. Baseline water quality data and the monitoring will be used in conjunction with the surface water, water quality monitoring will be conducted to evaluate the effectiveness of the stormwater runoff treatment and help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters.

AIR QUALITY:

As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odors. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cattle on site. EIS sections 4.19 and 4.25 were conducted during such weather events.

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established State Ambient Air Quality Standards (SAAQS) that are as strict or in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line. Emissions relevant to livestock operations include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure and landscape fertilization in the region is estimated to be 1,260 pounds annually, which is the total amount of nitrogen (total inorganic nitrogen) from the dairy operations or small businesses currently exist.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water discharge from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the groundwater from the HFFD nutrient budget at two percent of nitrogen (total inorganic nitrogen) per year. Against this nutrient input, the nutrient inputs from cattle for ground application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Bubba-Po‘ipu region were calculated to be 255 pounds (total inorganic nitrogen) per year. Against this nutrient input, the nutrient inputs from cattle for ground application would be conducted during such weather events.

The groundwater engineer estimated potential nutrient leaching from the dairy site to surface water and groundwater. The nutrient inputs were estimated to be 5.7 pounds (total inorganic nitrogen) per year. Against this nutrient input, the nutrient inputs from cattle for ground application would be conducted during such weather events.

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The air quality modeling conducted by MRCI for both domestic wastewater and land application of cattle feedlot effluent estimated the potential nutrient inputs from the dairy site to surface water and groundwater. The nutrient inputs were estimated to be 5.7 pounds (total inorganic nitrogen) per year. Against this nutrient input, the nutrient inputs from cattle for ground application would be conducted during such weather events.
DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylot” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pasture rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM_{10} and PM_{2.5}) measured on the island of Kauai, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM_{10} is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM_{2.5} is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists in laboratory conditions cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search "Hawaiian Dairy Farms": [http://tinyurl.com/OEQCKAUAI](http://tinyurl.com/OEQCKAUAI)

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
From: Cjbwilliams@aol.com
Sent: Sunday, February 08, 2015 6:47 AM
To: HDF
Subject: Mahaulepu dairy farm

Follow Up Flag: Follow up
Flag Status: Flagged

These articles say it better than I could. Many examples of what could go wrong with the cows on Kauai are addressed. Carol Williams, Koloa, HI

From: ronniecummins@organicconsumers.org
To: cjbwilliams@aol.com
Subj: Cowbells for #milktruth?

ESSAY OF THE WEEK
Cleaning Up after Big Ag

A “Cow Palace” in Washington State that threatens public health with its acres of untreated animal waste. A city in Iowa spending $1 million a year to keep illness-causing nitrates from farm runoff out of public drinking water.

And who can forget the plight of Toledo, Ohio, residents whose water last summer was so contaminated by farm runoff that they couldn’t even bathe in it, much less drink it?

For decades, America’s chemical-intensive, industrial farming operations have spewed nitrates and other toxic chemicals, animal waste, ammonia, antibiotics, carbon dioxide, nitrous oxide and methane gases into public air, waterways and communities.

BLOG POST OF THE WEEK
Cowbells for #milktruth?

Last week, OCA’s political and media consultant, Charlotte Warren, attended the International Dairy Foods Association (IDFA) conference in Boca Raton, Fla. There she learned that Big Dairy is feeling “under attack” by consumers who, well, simply want to know what’s in their milk and cheese, how factory farm dairies treat their animals, and by the way just how much pollution are those farms unleashing into U.S. waterways?

But instead of focusing on addressing consumers’ legitimate concerns, Warren learned, Big Dairy has hired public relations firms and a team of young social media wizkids to post and tweet about the wonderful wholesomeness of milk (produced in unwholesome conditions using unwholesome practices).


But the best session of all was “Telling the Milk Story: Safeguarding Consumer Confidence in Milk’s Goodness,” which included the launch of the “Get Real” social media campaign, complete with hashtag (#MilkTruth). And cowbells.
Dear Carol Williams:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**WATER QUALITY:** Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

**GROUND WATER**

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Nāpali formation lavas of the Waimea volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite,
a soft, thoroughly decomposed rock, the alluvial material still retains its high water quality and is generally shallow. No effluent will be applied and no animal manure will be allowed as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water movement. These wells were used to monitor the hydraulic conductivity of the unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

The alluvial material at the HDD site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of the volcanic series and the groundwater body in the alluvium is 84,800 gpd (0.085 MGD). The HDD site is located on the bottom land of the upper Hanalei Valley, which is a low stream discharge. There are no perennial streams coming off of the south slope of the Hanalei Ridge. These normally dry streams converge into a man-made channel running towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure facilities within this area will total less than 2 percent of the HDD site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for its development.
Stormwater General Permit. Management controls will include: minimizing irrigation water usage, keeping steps to make sure that the vegetated exposure of disturbed surfaces; monitoring and repair of structural controls; and buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrient from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlors is insufficient to meet the agronomic need of the pasture sediments. The quantity of nutrients supplied as natural fertilizer could occur on one per acre, phosphorus would be on the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that the Maui nutrient budget will carry three percent of nitrogen (totaling 108,000 lbs.) and 3.5 times more than the estimate of the potential discharge from HDF. The nutrient inputs to the system would be conducted during such weather events.

Impacts to the Nearshore Marine Environment. An assessment of nutrients inputs from the adjacent Kalaipoli region were also calculated to be 38,510 pounds annually, or approximately 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Kalaipoli region are constant throughout the year and to the same nutrient levels as from the proposed dairy as the remote areas are on private lands.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the Maui nutrient budget at two percent of nitrogen (totaling 2,170 lbs. per year). Again, this nutrient run-off would not occur as chronic daily release, rather, discharges would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of the time, more nutrient than groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 2,170 lbs. per year). The contamination in the alluvium can fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.
area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB, dairy neighbors and the local Kaua'i community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL, search “Hawai'i Dairy Farms”: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Laura Williams

Laura Williams
laurawilliams74@gmail.com

Subject: Hawai'i Dairy Farms
Environmental Impact Statement Preparation Notice
Māhāulepū Road
Kaua'i, Hawai'i

Dear Laura Williams:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows' health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

The following responses are offered to your comments:

**DAIRY OPERATIONS:** Hawai'i Dairy Farms (HDF) will establish and operate a sustainable, rotational-grazing dairy farm in Māhāulepū Valley on the island of Kaua'i to produce fresh, locally available nutritious milk for Hawai'i families. The rotational-grazing method utilizes 100 percent of the cows' manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals' diet. As part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3. The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a "zero-discharge, grass-fed dairy". The term "zero-discharge" under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows' manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to groundwater and surface waters. Therefore, HDF elected to discontinue use of the term "zero discharge" as it was construed as no nutrients into the system.

The term "grass-fed" was used in the HDF EISPN. This term was used to identify HDF's intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd's diet. In January 2016, the U.S. Department of Agriculture (USDA) Marketing Survey created a narrow legal definition of "grass-fed". The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of "grass-fed", the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area "footprint" will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1. Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd's primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient "dry matter" grass yields essential to a cow's diet. Additional project-specific trials at the Māhāulepū site on Kaua'i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows' diet: improvements in grass productivity are anticipated to provide up to 85 percent of cows' diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as "mob", mimicking the natural social order of herds. Cows spend 22 hours of each 24-hour period foraging on pasture or resting, outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The

Laura Williams
May 26, 2016
Page 2 of 11
Animals in various stages of lactation and rest will be transferred between HDF and pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven't given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, see Section 3.7 of the Draft EIS.

Smaller paddocks located near the dairy facility will be used as temporary pasture for cows or calves being moved on or off the farm. To protect the water quality of surface water and downstream areas, paddock fences are set back 35 feet from the edge of drainage ways throughout the site. Existing vegetation within the setbacks will be managed or restored to reduce erosion, improve stability of ditch banks, and exercise while being taken care of.

Health of the herd is of primary importance as the success of a dairy relies on cows being in high production and productive for a long time. Cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals, nutrition, health treatment, and milk processing. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

Irrigation water supply is provided to the farm from Waianae Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow precise application of irrigation water and/or diluted effluent on the pastures as well as the grounds. The system is designed to maximize water use efficiency and reduce potential for nutrient loss. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management, see Draft EIS Section 3.5.3 and Draft EIS Appendix B.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent. The irrigation system is designed to accurately apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

Technical consultants conducted field studies and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions were evaluated under the National Environmental Policy Act (NEPA) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

Hydrology:
The hydrology of the area consists of the Waianae volcanic series. Surface lavas of the Waianae formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a type of soil found in tropical and subtropical regions. Saprolite is formed by the weathering of volcanic rocks and is characterized by a high moisture content and low permeability.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material which is underlain by the Milolii Valley Floor, and (2) groundwater located in a shallow aquifer system within weathered volcanic material which is underlain by the Milolii Valley Floor. The Milolii Valley Floor is composed of dark brown to black clay and clayey silt.

WATER QUALITY:
Technicians conducted field studies and evaluated potential impacts from the proposed Hawai'i Dairy Farms (HDF) actions. Existing conditions were evaluated under the National Environmental Policy Act (NEPA) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material which is underlain by the Milolii Valley Floor, and (2) groundwater located in a shallow aquifer system within weathered volcanic material which is underlain by the Milolii Valley Floor. The Milolii Valley Floor is composed of dark brown to black clay and clayey silt.
soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater within the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlors and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

**Groundwater Monitoring:** Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

**Regional Water Demand:** The adjacent, developed Kōloa-Poipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Poipū - Kāhele districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

**Surface Water**

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Hā‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waipio Pit Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

**Potential Impacts from Construction:** The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site's western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SNWPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

**Surface Water Quality:** The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waipio Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore
increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhāʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.1 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīloa-Pōpū region were also calculated. Nitrogen input to the marine environment in the Pōpū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Pōpū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downdraft from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waiopili Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively dispenses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.
Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWB dairy neighbors and the local Kauai community.

AIR QUALITY: As part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylot" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kauai’s and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

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From: Pearl Wollin <pvwollin@hotmail.com>
Sent: Friday, February 20, 2015 4:13 PM
To: EPO
Subject: Fwd: EIS for maha ulepu/ Hawai‘i Dairy Farms

Addendum: I am also curious as to whether or not Hawai‘i Dairy Farms intends to use hormones and antibiotics. If they do, that is an additional concern for our watersheds, wells and ocean.

Begin forwarded message:

From: Pearl Wollin <pvwollin@hotmail.com>
Subject: EIS for maha ulepu/ Hawai‘i Dairy Farms
Date: February 20, 2015 12:10:57 PM HST
To: epo@doh.hawaii.gov

Name: Pearl V. Wollin
e-mail: pvwollin@hotmail.com

Comments: I attended the meeting last night, organized by Group 70, and have many concerns. The hiring of Group 7 was not an open bid: rather, Hawai‘i Dairy Farms, approached them. From the beginning, Hawai‘i Dairy Farms has not been honest in dealing with the citizens of Kaua‘i, and the DOH has been very lax in any kind of oversight. We first heard that a family farm was being developed, for milk for the keiki. Then we find that the owner is a billionaire, and this is his diversification. Most likely, Grove Farms has searched for a tenant for this land. The milk will not be processed here on the island, and there is a rumor that it will be sold to the military, and dry milk product will be sold on the world market. DOH did not do a study of the streams until local scientists began their own testing. So I am concerned about how accurate the results will be, as I know (retired faculty of academia) that data can be tweaked for desired results. I do not trust Group 7 nor DOH for this analysis, based on history of Hawai‘i Dairy Farms and DOH. (I sent you an e-mail some months ago about a community health concern, and did not even receive an automated response, let alone a reasoned reply.) So I recommend an independent review of the Group 7 results.

At the meeting, Group 7 held the meeting in a small school cafeteria, with the tables un-moveable, given the number of citizens who came to the meeting. The hired facilitator used a well developed protocol, but that was the extent of the process. She talked over any comments from the citizenry, even the Native Hawaiian who pointed out that she was asking us to respect Group 7, but did not respect his request to begin the meeting.
with a traditional blessing. In fact, there was no attempt to make this a cultural Hawaiian experience, other than having one of the sub-groups focus being culture and history, and some of the men wearing aloha shirts. Having a lavish food spread, which included cookies and milk didn’t impress, as any thing other than a rich man’s attempt to sweeten the audience.

I am concerned about there being a comprehensive sampling of the soil and water issues for the dairy, as well as surrounding lands. I live in Omao, and my own yard has different soils. One thing we do have on the South Shore is plenty of clay, which is just under the surface lava rocks.

I am concerned about the Hawai i Dairy Farms calling themselves "Grass farmers with a passion for dairy". What grasses will be used? Will they be grasses that sweeten the milk, as well as the soil? And there is no such thing as a zero discharge dairy. I grew up with family farms, and then lived in Snohomish County in Washington State for 23 years, while the farmers struggled with run-off and the salmon streams. We already have coral reefs threatened. I do not want this to be another example of going forward, and then the shocked recognition of the disastrous consequences.

May 26, 2016

Pearl Wollin
pwwollin@hotmail.com

Subject: Hawai i Dairy Farms
Environmental Impact Statement Preparation Notice
Mahu‘apapu Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003: 001 portion and 006 portion
(4) 2-9-001:001 portion

Dear Pearl Wollin:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

Your comments were received by the State of Hawai‘i Department of Health Environmental Planning Office. The Department of Health forwarded a copy of your comments to Group 70 International in order to be included in the Draft Environmental Impact Statement (EIS) analysis. This letter was prepared in response to your comments.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai‘i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future. For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

GROUP 70 OBJECTIVITY:

Group 70 International, Inc. (Group 70) is responsible for the preparation and processing of the Hawai‘i Dairy Farms Environmental Impact Statement (EIS). The EIS was prepared in accordance with the requirements of Chapter 343 Hawai‘i Revised Statutes and the "Environmental Impact Statement Rules" (Chapter 200 of Title 11, Hawai‘i Administrative Rules). The environmental planning team at Group 70 has prepared several hundred Environmental Assessment and EIS documents over the past 40 years, and every document has
Agricultural infrastructure and dairies operations are designed to support the dairy operations with the level of analysis required to properly evaluate and disclose potential cumulative and secondary effects. The DHS has determined that the dairy will provide grass as a primary food source closer to the natural diet of cows. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially identify appropriate varieties of grass and suitable sites to support sufficient "dry matter" grass yields essential to a cow's diet. Additional project-specific trials have identified sufficient field and nutrient levels to support up to 80 percent of the cow diet. Improvements in grass productivity are anticipated to provide up to 80 percent of the cow diet.

The rotational-grazing dairy provides a local feedstock—grass—as the herd's primary food source. Reducing imported feed levels to support sufficient "dry matter" grass yields essential to a cow's diet. Additional project-specific trials have identified significant yield increases in grass productivity are anticipated to support up to 80 percent of the cow diet. Improvements in grass productivity are anticipated to provide up to 80 percent of the cow diet.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent. The irrigation system is designed to support the pasture through the use of irrigation system that can be adjusted to meet the actual irrigation needs of the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation or dilution of irrigation water. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation or dilution of irrigation water. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation or dilution of irrigation water. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation or dilution of irrigation water. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation or dilution of irrigation water.
The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, organic by-products, waste water, organic matter, and irrigation water. Nutrient management is the practice of managing the amount rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected at least once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua’i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāʻulepū site applies to mature dairy cows. Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and infuse the beef market in Hawai‘i with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and ensure the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

SOILS: Soil is an ecosystem that can be managed to provide nutrients for plant growth, to absorb and hold rainwater for use during dryer periods, to filter and buffer potential pollutants from leaving fields, to serve as a firm foundation for agricultural activities, and to provide habitat for soil microbes to flourish and diversify to keep the ecosystem healthy. Two round of independent soil sampling were undertaken at HDF to understand and characterize available soil nutrients and conditions. Section 4.3 of the Environmental Impact Statement (EIS) characterizes soil conditions, and anticipated impacts from effluent and supplemental nutrient application. Recommendations from Dr. Russell Yant and Nicholas Knueger of the University of Hawai‘i at Mānoa are summarized. Their baseline nutrient report is included as Appendix C of the Draft EIS.

Soil conservation is a core principal behind establishment of the NRCS, which was formed out of the Soil Conservation Service to acknowledge its expanded role in watershed-scale approach using science-based tools and standards in agronomy, engineering economics, wildlife biology and other disciplines to aid landowners in implementation of conservation practices. NRCS conservation practices are listed in Chapter 3, Section 3.2; these practices codes identify design and construction standards related to drainage, materials operations and applicable engineering standards. HDF will follow the developed Conservation Plan, which was approved by the West Kaua’i Soil & Water Conservation District in December, 2013.

The United States Department of Agriculture (USDA) Natural Resources Conservation Services (NRCS) has mapped and classified soils for more than 94 percent of the United States. Comments received during the initial scoping for this EIS included a “Custom Soils Resource Report for Island of Kaua‘i, Hawai‘i.” The report was generated from the USDA NRCS website, which allows any internet user to define an area of interest, customize data results, and generate a Custom Soil Resource Report. The user can select or deselect parameters based upon which data the user would like to display. These user-generated reports are not evaluated by NRCS.

The NRCS soils classifications and descriptions provide a good information base, however, in-field soils testing is needed to identify existing soil nutrient levels and conditions. The most abundant soil types at the HDF site are Kalihi Clay at 32 percent, K‘e‘ena Clay Brown Variant at 29 percent, and Lualualei Clay at roughly 14 percent of the dairy site. Laboratory analysis of soil samples collected in 2014 identified levels of pH, phosphorus, nitrogen, potassium, calcium, magnesium, organic matter, salinity, micronutrients and other constituents. The results illustrate that the soils are depleted of nutrients, which is typical for lands formerly used for sugar cane. The soil nutrient status and fertility demands of the primary crop, Kikuyu grass, were used to identify the quantities of nutrients required for productive grass growth. The soils data provide a baseline to guide adaptive nutrient management throughout establishment and maturity of the dairy.

A second round of field sampling was conducted in 2015, and focused on evaluation of soils characterized as “poorly drained”, and established a quantitative baseline of soil salinity and sodicity to provide for future monitoring of soil health with
The groundwater and surface water analysis conducted for this Draft EIS examined whether the two waterbodies within Makahoa Valley may be connected. Four flow paths were determined, each with the potential for mixing groundwater and surface water.

As a result of reduced movement through the soil profile, the hydraulic conductivity of groundwater moving through the unweathered lavas of the Waimea volcanic series is orders of magnitude lower than the movement of water through soil profile, regardless of its depth. The resistance to flow in higher rates of denitrification. This is the conversion of potentially nitrate and nitrite to gases, which reduces the potential for impacts on waterbodies.

The performance of natural fertilizers to improve the physical, chemical, and biological condition of the soil. All potable water used as wash water will be reapplied to pasture and the quality of groundwater and surface water was documented.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500- acre grassed pasture can drive substantial accumulation of organic carbon in soil, with a potential to offset up to one-third of the annual increase in atmospheric carbon dioxide. The potential of organic matter and carbon dioxide, and the traditional and modern farming practices, will further improve the physical, chemical, and biological condition of the soil.
established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipi‘i region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipi‘i - Kalāheo districts), water use in 2035 is projected to be 324 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low-stream discharge. There are no perennial streams in the Māhāulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and

prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococci to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococci in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the National Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.
Nutrients from Effluent Irrigation and Commercial Fertilizer Application. The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kō‘olau-Po‘ipū region were also calculated. Nitrogen input to the marine environment in the Po‘ipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po‘ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Wai‘oli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring. Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i community.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEOCKUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Dear Kerry Wolny,

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice.

HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

**FLORA AND FAUNA:**

Botanical, avian, and mammalian surveys of the property were conducted for the Draft Environmental Impact Statement (EIS) to assess existing species on site, including identifying any species listed as endangered, threatened, or proposed under any state or federal endangered species programs in or near the property. EIS Sections 4.9 and 4.10 address the evaluation of flora and fauna resources, with technical studies in Appendix A and B.

A botanical survey of the dairy property was conducted in August 2014 by AECOS Consulting to assess existing plant species. The survey also investigated for the presence of plants currently listed as endangered, threatened or proposed for listing under Federal or the State of Hawai'i's endangered species programs, located onsite...
and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Nāpali formation lavas of the Waiākea volcanic series. Surface lavas of the Nāpali formation exhibit extensive weathering which may extend to considerable depths— as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.161 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlors and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,000 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane
plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhāʻulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipū – Kalāheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

Surface Water: The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhāʻulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhāʻulepū watershed.

The HDF site is located on the bottom-land of the upper Māhāʻulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhāʻulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococci to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhāʻulepū Surface Water Hydrologic Unit as the remote areas are on private lands. Complaints from the public citing the high levels of enterococci in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhāʻulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kaua‘i, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhāʻulepū Valley. The deme canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations: Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or
maintenance of existing or new animal walkways, stream crossings, and farm roads
in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources
Conservation Service (NRCS). These practices include setbacks to reduce runoff
that could carry particles into surface waters. Fences will be erected 35-feet from the
top of drainageways (totaling 70-feet in width) to keep cows away from surface waters.
Vegetated buffers will be established between the fences and drainageways
to create filter strips that could capture particulates during stormwater runoff events.
Another setback restricts application of effluent within 50 feet of the drainageways;
only irrigation water will be used in these areas as needed to maintain the vegetated
buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The
natural fertilizer from manure deposited directly to pasture and effluent collected
from the milking parlor is insufficient to meet the agronomic need of the pasture.
Grass crop with the committed herd size of 699 mature dairy cows, and
supplemental commercial fertilizer will be required. Nutrients required to sustain
the 470 acres of pasture are the same for the future contemplated herd size of up to
2,000 mature dairy cows, though the proportion of nutrients supplied as natural
fertilizer (manure and effluent) and commercial fertilizer changes. With the
potential future contemplated herd size, supplemental nitrogen will be needed, and
a small excess of phosphorus could occur. However, with an increase in dry matter
(DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in
a deficit and require commercial supplementation. Grass yields are anticipated to
increase more than three tons DM per acre with dairy establishment, from the
current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS
provides additional information.

The groundwater and surface water analysis conducted for the Environmental
Impact Statement estimated that surface water from Māhāʻulepū will carry three
times more nutrients than groundwater, due to the poor permeability of the
alluvium. Groundwater can discharge from the alluvium when it rises in wetter
periods and intersects the deep drainage ditches. Such discharge to the channels
could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through
groundwater from the HDF nutrient budget at two percent of nitrogen (totaling
10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per
year). Again, this nutrient runoff would not occur as chronic daily release, rather,
the runoff contributions would be limited to periods of the major rainfall over 0.8
inches. Such rainfall events are estimated to occur approximately three percent
of days, or an average of 10 days annually. Per best practices, no effluent application
would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kōloa-Pōʻipū region were
also calculated. Nitrogen input to the marine environment in the Poʻipū region is
calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of
potential nutrient throughput from HDF. Phosphorus for both domestic wastewater
and landscape fertilization in the region is estimated to be 1,260 pounds annually,
or 1.4 times greater than the potential discharge from HDF. The nutrient inputs
from domestic uses in the Poʻipū region are constant throughout the year and no
mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater
and surface water interaction with the marine water downgradient from the dairy site
was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the
Waipio Ditch provides the majority of freshwater input in the immediate coastal
area. Water chemistry measurements made by MRCI identified mixing of ditch
water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just
10 days annually from dairy operations will not adversely affect ocean water quality
and the marine environment. The nearshore area is a highly mixed environment
which actively disperses inputs within several meters from shore. Comparing
nutrient constituents in surface water samples taken from the HDF site and the
agricultural ditches down gradient to nutrients sampled in the nearshore ocean
water revealed that indicator bacteria were substantially lower in the ocean than in
ditch. The rapid decrease is likely a result of both physical mixing of water
masses and toxicity from saline water. In any event, the elevated levels of indicator
bacteria do not extend beyond the shoreline. Baseline water quality data and the
surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality
monitoring will be instituted in conjunction with the surface water quality
monitoring, to regularly sample and analyze the nearshore ocean waters. The
ongoing testing program will provide feedback to the dairy management team to
help ensure that nutrients and bacteriological constituents are not being released at
levels of environmental concern. Data from the nearshore water monitoring
program will be shared with the DOH CWR, dairy neighbors and the local Kaua‘i
community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air
quality conditions and project impacts were evaluated, including dust and odor.
Potential odors and emission levels for air pollutants relevant to dairy operations
were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25
provide an evaluation of air quality and odors, including a windrose depicting
wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality
technical report can be found in Draft EIS Appendix I.

Clean Air Act Under the Clean Air Act of 1970 (CAA), amended November 1990, the
U.S. Environmental Protection Agency (EPA) regulates both large and small sources
of air pollutants by establishing National Ambient Air Quality Standards (NAAQS)
for six criteria pollutants. The State of Hawai‘i has established its own State Ambient
Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than
the NAAQS. State standards prohibit any visible emissions of fugitive dust from
construction activities at the property line.
Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH$_4$) from enteric fermentation, and both methane and nitrous oxide (N$_2$O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

**DUST**

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the “drylots” of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM$_{10}$ and PM$_{2.5}$) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM$_{10}$ is 2.01 μg/m$^3$, well below the State standard of 150 μg/m$^3$. The estimated concentration for PM$_{2.5}$ is 0.23 μg/m$^3$, well below the Federal standard of 35 μg/m$^3$ (see Draft EIS Section 4.19.1 and Table 4-19.2).

**ODOR**

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odor emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in “odor units” at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

**ALTERNATIVES:**

As a part of the DEIS, alternatives were evaluated that could attain the objectives of the action’s purpose and need, and were compared with environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in DEIS Section 6.

MODELING results were generated for worst case meteorological conditions (low wind velocity/mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the “worst case” scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670 feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.
The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local, quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions; and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities (Criterion 3).
- However, after years of trying, it appears there was limited interest in such a venture.
- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to provide more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 4).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffer between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search “Hawai‘i Dairy Farms”: http://tinyurl.com/OEOCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

GROUP 70 INTERNATIONAL, INC.
Dear Pam Wolny:

Thank you for your letter concerning the Environmental Impact Statement Preparation Notice. HDF is committed to establishing a herd of up to 699 mature dairy cows to demonstrate the pasture-based system as an economically and environmentally sustainable model for Hawai'i. Precision agricultural technology that monitors cows’ health, grass productivity, and effluent management will be used to ensure environmental health and safety, as well as best management practices, and help determine the ultimate carrying capacity of the land. With proven success at a herd size of 699, HDF will contemplate the possibility of expanding the herd in the future.

For dairy operations with 700 or more mature dairy cows, additional regulatory review and permitting by the State Department of Health is required. At the discretion of HDF, management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā’ulepū area, as well as the parasites and predators that control those species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are

May 26, 2016

Pam Wolny
2229 Iukika Place
Koloa, HI 96756

Subject: Hawai’i Dairy Farms

Environmental Impact Statement Preparation Notice Māhā’ulepū Road
Kaua‘i, Hawai‘i

TMK: (4) 2-9-003: 001 portion and 006 portion
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employment multipliers, indirect employment related to Dairy construction would be expected to average about 12 jobs per year during the development period. This direct/indirect employment association would result in employment being expected to average approximately 35 jobs, of which 20 would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. With only two dairies remaining in the State (both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally supplied. The HDF project, with an established herd of up to 699 mature dairy cows, would contribute to the diversification of Kaua‘i’s economy, and approximately 4.4 million gallons (36,719,780 pounds) of milk would be produced. This would double the milk production currently supplied. The State will derive approximately $360,000 annually in net income to the State from the contemplated 2,000 mature dairy cows.

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The potential impacts of Hawai‘i Dairy Farms (HDF) to the existing economy were evaluated in the Draft Environmental Impact Statement (EIS) Section 4.15, which includes demographic and economic factors, with the complete report in Appendix J.

The HDF project would create short-term benefits through jobs for local construction personnel and local material suppliers. Such jobs would include equipment operators, cement workers to lay foundations, steel workers to build feedlots, construction crews, and other personnel. Depending on the scale of the project, additional employment generated by the project would be expected to average about 12 jobs per year during the development period. This direct/indirect employment association would result in employment being expected to average approximately 35 jobs, of which 20 would be on Kaua‘i.

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WATER QUALITY: Technical consultants conducted field studies and analysis on groundwater and surface water resources in the area, and evaluated potential impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions and probable impacts are presented in the Draft Environmental Impact Statement (EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E and F. The location and connectivity of groundwater bodies were determined, and the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali formation exhibit extensive weathering which may extend to considerable depths – as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite, a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with alluvium, which generally extends about 60 feet under the surface and is underlain by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa series. The alluvial material is highly weathered lava and is comprised of dark brown to black aldy and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified two groundwater bodies within the valley: (1) groundwater located in a deep aquifer system within unweathered volcanic material, which is buried beneath thick alluvium that covers the valley floor, and (2) groundwater in the thick alluvium. The aquifer of highest value and use resides deep within the unweathered volcanic material. The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient and is expressed in units of feet per day. It is a measure of how easily water will move through the ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether the two waterbodies within Māhā‘ulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

Potable Water: Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhā‘ulepū 14 well during the sugarcane plantation era. All potable water used as livestock water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhā‘ulepū 14 well and the County’s Kōloa F well, will result in no adverse impacts to ongoing use of groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well.

THOUGH the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kōloa F well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Poipū region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,853 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Poipū - Kalahoe districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface...
Normal ongoing farming and ranching Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhū'ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhū'ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha'upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhū'ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kauai Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwahi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data, however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhū'ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhū'ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator level of enterococcus found in ditches running through Māhū'ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, US Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the Natural Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 15-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to create filter strips that could capture particulates during stormwater runoff events. Another setback restricts application of effluent within 50 feet of the drainageways; only irrigation water will be used in these areas as needed to maintain the vegetated buffer and pasture grass, keeping nutrient applications away from waterways.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorus would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 162 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhū'ulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhū'ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator level of enterococcus found in ditches running through Māhū'ulepū Valley. The dense canopy along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).
To provide perspective, nutrient inputs from the adjacent Kīlauea-Po'ipū region were also calculated. Nitrogen input to the marine environment in the Po'ipū region is calculated to be 38,510 pounds annually, or 35 times more than the estimate of potential nutrient throughput from HDF. Phosphorus for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment. An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipūlī Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches downgradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH GWR, dairy neighbors and the local Kaua'i community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EB sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai'i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM₁₀ and PM₂.₅) measured on the island of Kaua'i and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM₁₀ is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM₂.₅ is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy feeders and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were
applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OIEC website at the following URL, search "Hawai‘i Dairy Farms": http://timeurl.com/OIEC3A10A

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
DAIRY OPERATIONS: Hawai'i Dairy Farms (HDF) will establish and operate a sustainable, pastoral rotational-grazing dairy farm in Māhā'ulepū Valley on the island of Kaua'i to produce fresh, locally available nutritious milk for Hawai'i families. The rotational-grazing method utilizes 100 percent of the cows’ manure as natural fertilizer to grow pasture grass as a primary source of nutrition for dairy cows. This cost-effective method will reduce reliance on imported fertilizer and feed. Pasture grass will comprise at least 70 percent of the animals’ diet. As a part of the Draft Environmental Impact Statement (EIS), the proposed facilities and operations for the dairy farm are described in Chapter 3.

The Environmental Impact Statement (EIS) Preparation Notice (EISPN), published January 23, 2015, described the proposed pasture-based rotational grazing system as a “zero-discharge, grass-fed dairy.” The term “zero-discharge” under the U.S. Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the U.S. Department of Agricultural (USDA) Marketing Survey created a narrow legal definition of “grass-fed.” The USDA standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture on a forage-based diet. Due to the evolving definition of “grass-fed”, the term in not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farmed area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1. Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and support the need for sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhā'ulepū site on Kaua'i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.
dairy. Throughout the less than 30-day storage period, effluent is planned for application every 45 days, to ensure that the ponds are kept at manageable levels.

Cow lactate milk following the birth of calves. Newborn calves will be housed in the milking facility and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transferred to pasture at HIF and HU, HME, HU2, and HU3. After a growth period of approximately 10 months, calves will begin producing milk. Male calves will be sold as part of the beef cattle herd, before 10 months of age. The female calves will be sent to an adjacent calf-mill for further care and milk production. The process of transferring the calves is highly automated, minimizing the stress and handling risk associated with the transportation of young animals.

MANAGEMENT OF THE HERD

Health of the herd is of primary importance as the success of a dairy relies on cows being healthy and productive. Animals in various stages of lactation and rest will be transferred between the HIF and HU facilities on a rotational basis to ensure that the herds are maximally productive. The management of the herd includes regular health checks and treatment plans to prevent the spread of diseases and ensure a high level of milk quality.

While the dairy facilities are designed to minimize stress and maximize productivity, the health and well-being of the cows are always a top priority. The facility is equipped with state-of-the-art technology to monitor cow health and productivity, ensuring that any issues are addressed promptly.

ALTERNATIVES

As a part of the DBS, alternatives were evaluated that could attain the objectives of the action, regardless of cost. The alternatives were assessed against the criteria of environmental benefits, costs, and risks. The evaluation process included a detailed analysis of the potential environmental impacts, economic viability, and practical feasibility of each alternative. The alternatives considered include different management strategies, irrigation systems, and waste management practices.

The process of evaluating the alternatives included a thorough review of the existing practices and the potential benefits and drawbacks of each alternative. The evaluation process was guided by the principles of sustainability and environmental stewardship, ensuring that the best possible solution is chosen for the proposed dairy project. Further discussion of alternatives can be found in the Draft EIS Section 6.

The BRS evaluates alternatives that could attain the objectives of the action’s purpose and need, and compares environmental benefits, costs, and risks of each reasonable alternative against those of the proposed dairy project. Further discussion of alternatives can be found in the Draft EIS Section 6. Four possible land uses that would not meet the project purpose are discussed. These options would not be reasonably viable given the existing private and tenure agreements, and no reasonable and use alternatives that emerged from public input during the project constraining discussion. The alternatives that do not meet the project purpose are not evaluated for analysis of environmental benefits, costs, and risks.

The 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. The timing and application of nutrients will correspond with plant uptake, soil properties, and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.
uses as they could be permitted within the existing State Land Use Agricultural District and County Agricultural Zoning District. These options include Agricultural Park with Processing Center, and development of an Agricultural Subdivision. The alternatives were examined and eliminated from further analysis, however, as they would not fulfill the project purpose.

The analysis, therefore, focuses on alternatives that meet the project purpose. Rigorous exploration and evaluation of the environmental impacts of the alternatives, including those that might enhance environmental quality or avoid, reduce or minimize some or all of the adverse environmental effects, costs and risks. These alternatives include: (1) the development of a Conventional Feedlot Dairy (a non-pasture-based dairy) at the same location; (2) development of the Pasture-Based Dairy at an Alternative Location on Kaua‘i; and (3) milk products processing by HDF. The alternative of “No Action” is also evaluated.

The alternatives analysis provides a comprehensive evaluation of the range of potential alternatives, including the two alternative development scenarios. Although the alternatives are potentially reasonable uses under existing zoning and neighboring uses, each fails to comprehensively fulfill the project requirements defined by the eight Project Objectives and the four established Evaluation Criteria (Chapter 2, Sections 2.3.3 and 2.3.4).

The essential differences as compared to the proposed action are highlighted in the following statements.

- Only one of the alternative actions (conventional feedlot alternative) would create a commercial scale dairy operation in Hawai‘i, with the capability to produce 10 percent of the State’s fresh milk demand thus reducing dependence on imported milk (Objective 1). This alternative, however, would not reduce reliance on costly imported fertilizer and feed (Objective 2); grow local quality grass as a primary feedstock (Objective 3); and would not utilize 100 percent of manure on site as nutrients to grow forage for dairy cows (Criterion 4).
- None of the alternatives would secure a dairy location that meets the requirements for a pastoral, pasture-based grazing dairy: sufficient contiguous land area; available long-term land tenure; adequate potable water supply; suitable soil properties; gentle slope conditions and accessibility (Criterion 1).
- One alternative (Agricultural Park) could potentially generate new long-term employment in the agricultural sector on Kaua‘i in a wide range of positions including pasture agronomy/soil science, environmental resources management (Criterion 2).
- The Agricultural Park alternative could also develop sustainable food production utilizing Important Agricultural Lands, demonstrating the importance of long-term agricultural leases and capital investment for agricultural infrastructure, water systems and support facilities. (Criterion 3).

However, after years of trying, it appears there was limited interest in such a venture.

- Finally, addressing the range of potential environmental impacts (natural, cultural, social and economic) (Objective 8) the two alternative development scenarios would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.

In contrast to the other options considered, the planned agricultural operation of Hawai‘i Dairy Farms, was determined to be the most viable option and is the preferred alternative. Of all the alternatives considered, this is the only approach that achieves project objectives and meets each of the four Evaluation Criteria.

- Hawai‘i Dairy Farms will create a commercial scale pasture-based dairy operation in Hawai‘i, with the capability to produce more than 1,000,000 gallons of the fresh milk demand, reducing dependence on imported milk (Objective 1).
- The planned dairy location meets the requirements of minimum land area, soil properties, slope conditions, water supply, land tenure and availability, and accessibility (Criterion 1).
- The planned action will generate new long-term employment in the agricultural sector on Kaua‘i, including pasture agronomy/soil science, veterinary and animal husbandry, environmental resources management, milk/milk processing, and dairy business management (Criterion 2).
- Sustainable food production utilizing Important Agricultural Lands (Criterion 3) will occur with the proposed action, demonstrating the importance of long-term agricultural leases, and the ability to draw capital investment for agricultural infrastructure including water systems and support facilities (Criterion 3).
- Address the range of potential environmental impacts by utilizing 100 percent of manure as natural fertilizer to grow the majority of food for cows (Criterion 4). The alternatives evaluated would generate fewer beneficial impacts and produce impacts that could potentially exceed those anticipated from the proposed project.
- Creating an economically viable pasture rotational-grazing model maintains agriculture, retains open space, and provides buffers between highly utilized resort and residential development and sensitive natural or cultural resources (Objective 8).
This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: http://tinyurl.com/OEQCKAUAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate controls that species.

An especially important insect to minimize fly breeding habitat in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetle species work to bury dung pats in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch. Breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work to bury dung pats in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch. The behavior of HDF management may choose to expand operations up to the carrying capacity of the land, which is estimated to be up to 2,000 productive milking dairy cows. Permit process compliance would be followed at such time HDF may decide to pursue an expanded operation.

The following responses are offered to your comments:

PESTS: A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhāʻulepū area, as well as the parasites and predators that control these species. No federally or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua’i but not seen at the HDF site include the house fly, the dog dung fly and the chicken dung fly. These pests...
employment would be expected to average about 12 jobs per year during the
development period. Thus direct-plus-indirect employment association with
construction would be expected to average approximately 36 jobs, of which 28
would be on Kaua‘i.

The HDF project would contribute to diversification of Kaua‘i’s economy, which is
heavily based on the visitor industry. With only two dairies remaining in the State
(both on the Hawai‘i Island), approximately 10 percent of Hawai‘i’s milk is locally
supplied. The HDF project, with an established herd size of up to 699 mature dairy cows,
will increase the supply of local fluid milk by approximately 12 million gallons of
milk annually, a 50 percent increase in statewide milk production. On-going dairy
operations at the committed herd size will provide approximately 16 direct and
indirect full-time equivalent jobs on Kaua‘i, including 5 farm jobs and about 11
indirect jobs. An additional 6 indirect jobs related to on-going dairy operations
would be created on O‘ahu.

HDF is expected to generate a net income of approximately $68,000 to the County
when the 699 cow herd is established. When the dairy has matured to full
production for the 699 cow dairy, net income to the State is calculated at $160,000
annually. With the potential contemplated herd size of up to 2,000 mature dairy
cows, approximately 4.4 million gallons (36,719,780 pounds) of milk would be
produced. This would double local milk production currently supplied by operational
dairies on the Island of Hawai‘i.

Additional employment generated by a possible expansion to accommodate the
contemplated 2,000 mature dairy cow herd is estimated at approximately 3
construction jobs plus 4 indirect jobs on Kaua‘i, and 2 indirect jobs on O‘ahu for a
total increase of 9 jobs. For on-going operations at the contemplated herd size, an
additional 5 full-time farm jobs would be added, with approximately 15 additional
indirect jobs on Kaua‘i and another 8 indirect jobs on O‘ahu.

The dairy is expected to generate a net additional contribution to the County of
approximately $8,000 for improvements related to expansion for the contemplated
herd size of up to 2,000 mature dairy cows ($76,000 total versus $68,000 for the
committed herd size). The State will derive approximately $360,000 annually in
revenues from the contemplated 2,000-mature dairy cow dairy.

Results of technical studies and the findings of this Draft EIS show no unmitigated
nuisances that could affect property values as a result of dairy implementation or
operations. No noticeable odors, flies, noise, waste or water discharges will impact
resort or residential areas. As such, the dairy will not adversely affect residents,
neighboring recreational activities, guests in nearby resorts, or diminish property sales or
property values in the area.

WATER QUALITY: Technical consultants conducted field studies and analysis on
groundwater and surface water resources in the area, and evaluated potential
impacts from the proposed Hawai‘i Dairy Farms (HDF) actions. Existing conditions
and probable impacts are presented in the Draft Environmental Impact Statement
(EIS) sections 4.16, 4.17, 4.22 and 4.23; the technical reports are in Appendices E
and F. The location and connectivity of groundwater bodies were determined, and
the quality of groundwater and surface water was documented.

GROUND WATER

Hydrology: The area’s hydrology is shaped by its geology. The Kōloa area was built
by Napali formation lavas of the Waimea volcanic series. Surface lavas of the Napali
formation exhibit extensive weathering which may extend to considerable depths –
as great as 400 feet below sea level. Weathered lava in the area is typically Saprolite,
a soft, thoroughly decomposed rock. The Māhā‘ulepū Valley floor is filled with
alluvium, which generally extends about 60 feet under the surface and is underlain
by highly weathered lava at a shallow depth by secondary eruptions of the Kōloa
series. The alluvial material is highly weathered lava and is comprised of dark
brown to black silty clay and clayey silt.

The groundwater and surface water analysis conducted for this Draft EIS identified
two groundwater bodies within the valley: (1) groundwater located in a deep
aquifer of highest value and use resides deep within the unweathered volcanic
material. The alluvial material blanketing the valley floor is less permeable than the
unweathered volcanics by orders of magnitude. Hydraulic conductivity represents
the ability of soils to transport water given a hydraulic gradient, and is expressed in
units of feet per day. It is a measure of how easily water will move within the
ground. The hydraulic conductivity of the alluvium that underlies Māhā‘ulepū Valley
and the HDF site ranges from 105 – 500 feet per day. The hydraulic conductivity of soils
in the adjacent Kōloa-Po‘ipū region is on the order of 201 – 500 feet per day.

Therefore, water movement through soils under the proposed dairy site is 10 times
tower than the neighboring area.

The groundwater and surface water analysis for this Draft EIS examined whether
the two waterbodies within Māhā‘ulepū may be connected. Four studies were
conducted to determine whether the shallow groundwater in the alluvial material
might discharge into the lower aquifer confined in the unweathered volcanic
material at depth, which is the source of potable water. The studies demonstrated
there is no hydrologic connection between the deep aquifer in the unweathered
volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft
EIS provides further detail.

Possible Water: Once fully operational at the committed herd size of 699 mature
dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million
gallons per day (MGD), of potable (drinking water quality) water from groundwater
provided through an on-site well. The State of Hawai‘i Department of Health Milk
Rules require that potable water be used for milk production, both in the milking
parlor and for milking operations; another potable water use will be for livestock
drinking water. Should HDF decide, in the future, to expand to the contemplated
herd size of up to 2,000 mature dairy cows, potable water demand will increase to
84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD

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Groundwater and surface water resources in the area were evaluated, and the quality of groundwater and surface water was documented. The HDF project is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. Additional employment is expected, with a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd estimated at 9 jobs. The dairy is expected to generate a net income of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows. The project will contribute to diversification of Kaua‘i’s economy, which is heavily based on the visitor industry. The area’s hydrology is shaped by its geology, with the Kōloa area built by Napali formation lavas of the Waimea volcanic series. Surface lavas exhibit extensive weathering which may extend to considerable depths. The HDF project is expected to generate a net income of approximately $68,000 to the County when the 699 cow herd is established. Additional employment is expected, with a possible expansion to accommodate the contemplated 2,000 mature dairy cow herd estimated at 9 jobs. The dairy is expected to generate a net income of approximately $8,000 for improvements related to expansion for the contemplated herd size of up to 2,000 mature dairy cows.
produced by the on-site, existing Māhūʻelepū 14 well during the sugarcane plantation era. All potable water used as wash water at the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhūʻelepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) – Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural control; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment logs around drain inlets.

Surface Water Quality: The Kauaʻi Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makauwai Cave Reserve in April of 2014. The group reported high levels of enterococcus to the State Department of Health (DOH) and provided its data; however, DOH was unable to utilize the data as it did not meet Clean Water Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhūʻelepū Surface Water Hydrologic Unit as the remote areas are on private lands. Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy prompted CWB to conduct a “Sanitary Survey” of the Māhūʻelepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator levels found in ditches running through Māhūʻelepū Valley. The dense canopied along the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacteria levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations: Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or
and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Po'ipu region are constant throughout the year and no mitigation is applied to reduce the quantities.

Impacts to the Nearshore Marine Environment: An assessment of groundwater and surface water interaction with the marine water downgradient from the dairy site was conducted by Marine Research Consultants, Inc. (MRCI). Surface water from the Waipouli Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

Establishment of Water Quality Monitoring: Long-term ocean water quality monitoring will be instituted in conjunction with the surface water quality monitoring, to regularly sample and analyze the nearshore ocean waters. The ongoing testing program will provide feedback to the dairy management team to help ensure that nutrients and bacteriological constituents are not being released at levels of environmental concern. Data from the nearshore water monitoring program will be shared with the DOH CBW, dairy neighbors and the local Kauai community.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawaii has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the
NAAS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gasses related to dairy cows include methane (CH₄) from enteric fermentation, and both methane and nitrous oxide (N₂O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odors emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity/mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas.

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner
Thank you very much for the opportunity to ask questions that will be included into the EIS for HDF. I have some environmental concerns regarding this concentrated dairy project.

I have lived on Kaua‘i forty years and have seen several prolonged rain events. I have seen 2 15” rain days followed by a 10” rain day, all in a row.

Q - If the retention ponds are full or close to full because they are draining slowly, what will happen to the overflow? Soil can only hold so much water and waste and I envision massive flooding and runoff with prolonged heavy rain events.

Q - also, during a heavy rain event, will the cows be milked? If they are on the cement walk area, milk area, and it is raining hard and the are eliminating waste, where will that go?

I lived on Long Island, New York before living here. There were many farms in the 60’s. I used to surf there, carrying a 35 pound surfboard. We used to get bit by flies, a very painful bite. We know that there will be flies associated with the cattle and their waste. It is my understanding that these flies, not house flies, have a 4 mile capability of flight. A four mile circumference from the dairy encapsulated Po‘ipu, Koloa and all the way to Kaua‘i Community College.

Q - What remediation will be present to deal with flies? Again, these are not common house flies.

Thank you,
Robert Zelkovsky
40 year Kaua‘i resident
Environmental Protection Agency related to concentrated feeding operations (CAFO) is a system designed to not discharge pollutants into waters of the United States. As noted previously, the HDF system is designed to utilize 100 percent of the cows’ manure on-site. However, nutrients would be introduced to the HDF site with any use; the Draft EIS identifies the amount of nutrients anticipated from the proposed dairy operations that could pass through to ground and surface waters. Therefore, HDF elected to discontinue use of the term “zero discharge” as it was construed as no nutrients into the system.

The term “grass-fed” was used in the HDF EISPN. This term was used to identify HDF’s intent to utilize a locally-produced feedstock – grass – for more than 70 percent of the dairy herd’s diet. In January 2016, the USDA’s standard defines what animals can and cannot be fed. The Food Alliance, a project of several northwest colleges, believes that when consumers choose grass-fed products there is an expectation that these will come from animals raised on pasture or a forage-based diet. Due to the evolving definition of “grass-fed”, the term is not used in this EIS.

The dairy facilities will occupy an area of approximately 10 acres on the western boundary of the site. The developed area “footprint” will be less than 2 percent of the total farm area. Four buildings will be constructed to serve different functions, supported by utilities and infrastructure. Additional building information can be found in Draft EIS Section 3.3.1.

Agricultural infrastructure and utilities required for the dairy operations will include storage tanks and silos, effluent storage ponds, livestock water systems, and drainage improvements. The irrigation system and distribution of livestock water are discussed in Draft EIS Section 3.5, Pasture Management.

The pastoral rotational-grazing dairy provides a local feedstock – grass – as the herd’s primary food source. Reducing imported feed stabilizes costs and provides a food source closer to the natural diet of cows. Results of grass trials initially conducted at five sites across four Hawaiian Islands were instrumental in identifying appropriate varieties of grass, and suitable sites to support sufficient “dry matter” grass yields essential to a cow’s diet. Additional project-specific trials at the Māhāʻulepū site on Kaua‘i have been conducted for more than 18 months. The results have identified sufficient yield and nutrition to supply 70 percent of the cows’ diet; improvements in grass productivity are anticipated to provide up to 85 percent of cows’ diet.

The pasture-based model allows cows to move about freely, and to lie down and rest, which is part of the digestion cycle. The animals are managed in social groups known as “ mobs”, mimicking the natural social order of bovines. Cows spend 22 hours of each 24-hour period foraging on pasture or resting outdoors in natural light and fresh air. The gently sloped paddocks, walkways and races minimize the energy expended by the mature dairy cows as they graze or are transferred to and from the various paddocks and the mature dairy facility; surfaces of the walkways and cow races are designed to provide a comfortable path under hoof. The management practices and pasture model applied by HDF maximizes grass as the cows’ primary nutrition source and minimizes stress to the animals. Cows tend to be healthier and live longer, productive lives with access to fresh air, high quality feed, and exercise while they forage.

The 470 acres of pasture will be divided into paddocks averaging 3 to 5 acres in size. Smaller paddocks located near the dairy facility will be used as temporary pasture and exercise while they forage. They will be managed or restored to reduce erosion, improve stability of ditch banks, increase net carbon storage, and improve and maintain water quality.

The majority of the pastures will be irrigated with non-potable water and/or diluted effluent through either the pivot irrigation systems or through gun irrigators. Irrigation water supply is provided to the farm from Waitea Reservoir, and will be filtered and pumped to the various irrigation components on the farm. The irrigation system is controlled using computer software and GPS receivers to allow very precise application of irrigation and/or diluted effluent on the pasture. The pivots can rotate and apply irrigation water and/or diluted effluent at different rates depending on the actual irrigation needs of the farm.

NRCS provides technical guidance on applying agricultural waste depending on the desired use of the waste. Reflecting in the title of the livestock waste guidance for Hawaii is the parenthetical inclusion of the word “nutrients.” Where waste is utilized as a resource, it is being used for the constituent components that provide benefit. The NRCS Conservation Practice Standard 590, Nutrient Management, applies to commercial fertilizers, wastewater, organic by-products, and irrigation water. Nutrient management is the practice of managing the amount, rate, source, method of application, and timing of plant nutrients and soil amendments. The timing and application of nutrients will correspond with plant uptake, soil properties and weather conditions. For more information on nutrient balance management see Draft EIS Section 3.5.3, and Draft EIS Appendix D.

The effluent storage ponds are sized to accommodate 30 days of storage for up to 2,000 mature dairy cows, and over 85 days of storage for 699 mature dairy cows. It will be highly unlikely that the storage pond will be full at any time for the contemplated 2,000-cow dairy, and nearly impossible for the committed 699-cow dairy. Throughout the less than 30-day storage period, effluent is planned for application every four days, and the slurry application is expected to be about once every 45 days, to ensure that the ponds are kept at manageable levels.

Cows lactate milk following the birth of calves. Newborn calves will be housed on the Māhāʻulepū site and provided essential colostrum and nutrients for a healthy start. During the calves’ initial 90 days, they will be transitioned to pasture at HDF before transfer to ranches on Kaua‘i to be raised off-site. The committed herd size of 699 mature dairy cows at the Māhāʻulepū site applies to mature dairy cows.
Animals in various stages of lactation and rest will be transferred between HDF and other partner ranches as needed for animal health and dairy productivity. This will benefit both the dairy and the beef market in Hawaii with a new, local source of pasture-raised calves. Male calves will become part of the beef cattle herd; heifers (young female calves that haven’t given birth) will be raised until ready to return to the HDF herd as a birthing/mature dairy cow. For more information on off-site herd management, refer to Section 3.7 of the Draft EIS.

Health of the herd is of primary importance as the success of a dairy relies on cows effectively producing quality milk. All cows will be treated with a high standard of care. Dairy managers and caretakers will be trained and competent in handling animals to minimize stress and protect the herds’ welfare. A licensed veterinarian may prescribe use of antibiotics approved by the Food & Drug Administration (FDA) for treatment of illnesses. Adherence to guidelines that prohibit milk from cows undergoing antibiotic treatment will ensure no adulteration of milk. Routine laboratory tests of milk for traces of antibiotic residue will be conducted. HDF will not inject cows with bovine growth hormone, referred to as rBST or rBGH.

**NATURAL HAZARDS:** The potential impacts of natural hazards are evaluated in the Draft Environmental Impact Statement (EIS), including flooding, tsunami, earthquakes, and hurricanes. Draft EIS Section 4.6 addresses natural hazards.

The Māhā‘ulepū property is not known to experience flooding conditions. The area is located within the Federal Emergency Management Agency (FEMA) Zone X, areas determined to be outside the 0.2% annual chance floodplain. The proposed location for Hawai‘i Dairy Farms (HDF) lies between the 60 and 150 feet elevation, outside the tsunami evacuation zone. The Kaua‘i and Ni‘ihau region of the Hawaiian Islands has experienced tremors from earthquakes originating further south in the island chain, but no known seismic activity has originated among these northern islands. Although they occur infrequently, Kaua‘i has received a greater amount of damage from hurricanes when compared to the other Hawaiian Islands. Land management personnel in the Māhā‘ulepū region during and following the hurricanes that affected Kaua‘i in 1982 and 1992 observed defoliation of vegetation, and no flooding events in the period following passage of the storms.

Preparedness is the best protection for natural disasters. Structural design of dairy facilities will meet International Building Code (IBC) 2006 standards with local amendments. Provisions in design will address wind loading (including hurricane gusts), rain and flood loading, and earthquake loading. A geotechnical evaluation of the area recommended Seismic Site Class D under IBC standards be utilized for foundation design where the barns and agricultural infrastructure will be constructed.

There has been no rainfall event that would exceed the capacity of the effluent ponds since rainfall has been recorded in Māhā‘ulepū Valley. The effluent pond capacity has been designed above the regulatory requirement to contain the 25-year, 24-hour rainfall event. An emergency containment berm with additional capacity for another 30 days is included in the design. This design exceeds regulatory requirements, with containment in excess of the major rainfall events recorded on Kaua‘i over the past three decades.

An emergency preparedness plan for protection of animals has been prepared for HDF internal use that addresses hurricane, fire, and potential flooding hazard scenarios. HDF is not in a tsunami inundation area, so this scenario is not planned for in the disaster plan. The disaster plan relies upon knowledge of cow behavior, and is based on extensive guidance for livestock protection from NRES, the Florida State Agricultural Response Team (SART), Pennsylvania State College of Agricultural Sciences, and Cornell University Cooperative Extension. The plan includes safety procedures during any disaster, follow up actions, and emergency contacts for assistance before, during or following the event. Further information is provided in the Draft EIS Section 4.6.2.

**PESTS:** A study of invertebrate species and pest insects was conducted by Steven Lee Montgomery, PhD, Consulting Biologist in January 2016. The study summarizes the presence or absence of native species or pest species associated with cattle manure in the general Māhā‘ulepū area, as well as the parasites and predators that control those species. No federal or state listed endangered or threatened invertebrate species were noted in the survey of the site. A full report and list of species found on site is provided in EIS Section 4.11 and Appendix B.

Flies were identified on the HDF site using manure from neighboring livestock as bait for invertebrates. The two flies associated with livestock are the stable fly and the horn fly, the latter known for biting cattle. These flies and the greenbottle fly are often confused with the house fly. Flies known to exist on Kaua‘i but not seen at the HDF site include the house fly, the dog dung fly, and the chicken dung fly. These pests are common in areas with high pet populations. It is possible these fly species could inadvertently be brought to the dairy and utilize manure as a food source. HDF will prevent and control fly population growth through diligent clean up and sanitation practices regarding any trash and food waste, as well as through efficient manure composting practices. A full list of site management measures is provided in EIS Section 4.11. The project location does not provide any habitat for drosophila muscipula, the only Kaua‘i species of native Hawaiian fly listed as Endangered or Threatened. Native Drosophila habitat is located many miles away in the high elevation koa-‘āhi‘a forests.

Fly populations at HDF will be minimized through a process known as Integrated Pest Management (IPM). Essentially, IPM disrupts reproduction with appropriate means at key points in the pest’s life cycle. Used in Hawaii for decades, a number of invertebrates and a bird (the cattle egret) were introduced between 1998 and 1950 to reduce livestock-reared insects. IPM utilizes knowledge of the ancient food web among species.

An especially important insect to minimize flying breeding habit in manure is the dung beetle, which buries manure and incorporates it into the soil. Populations of dung beetles found on Kaua‘i and those species already in Māhā‘ulepū Valley, will increase with the increased manure food source, thus increasing and speeding breakdown of...
manure. Dung beetles are specialists in the very important natural process of breaking up and quickly recycling bovine manure pads. The behavioral diversity among dung beetle species will work together to bury dung pads in one to three days, a shorter amount of time than the 10-30 days flies eggs need to hatch.

In the Kōua-Po'ipu region, pest fly populations are dependent upon food and breeding sources nearby such as dog, cat, and chicken feces. Beef cattle graze in the region on agricultural lands along Ah Kinohi Road between Kōua and Po'ipu, and it is likely the livestock-related flies identified at the HDF site occur in this region as well. Localized controls to reduce pest populations need to address breeding sites in and amongst the food and animals wastes within the area. These mitigation measures will make it difficult for flies to breed, and BMPs will be enforced to address any increase in population, therefore it is expected that the dairy farm will not significantly affect recreational and resort areas.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL search "Hawai'i Dairy Farms": http://tinyurl.com/OEQCKAUA

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

Aloha,

I would like to provide comments related to the HDF proposed operation on the south side of Kauai. I have lived on Kauai for over 37 years and cherish our beautiful Island. I cannot begin to express my disappointment with HDF for attempting to bring an ecological nightmare to this Island. We do not need a dairy farm polluting our precious environment and the natural resources surrounding the property (air, water table, and ocean). I have spent time in the Midwest and can only describe the odor generated from various livestock operations as disgusting and the land occupied by such farms are much larger than the Island of Kauai.

I would appreciate you withdrawing your planned operations and show some consideration for the aina and community here on Kauai. I have one question for the ownership of HDF, do you really need the money and shame on Grove Farm ownership for allowing the proposed HDF operations to move forward on this sacred land.

Respectfully,
Jack Zimmerman
1666 Kelaukia Street
Koloa, Hawaii 96756
The alluvial material is highly weathered lava and is comprised of dark brown to black silty clay and clayey silt.

The alluvial material blanketing the valley floor is less permeable than the unweathered volcanics by orders of magnitude. Hydraulic conductivity represents the ability of soils to transport water given a hydraulic gradient, and is expressed in units of feet per day. It is a measure of how easily water will move within the ground. The hydraulic conductivity of the alluvium that underlies Māhāʻulepū Valley and the HDF site ranges from 10.5 – 50 feet per day. The hydraulic conductivity of soils in the adjacent Kōloa-Poipū region is on the order of 201 – 500 feet per day. Therefore, water movement through soils under the proposed dairy site is 10 times slower than the neighboring area.

The groundwater and surface water analysis conducted for this Draft EIS examined whether the two waterbodies within Māhāʻulepū may be connected. Four studies were conducted to determine whether the shallow groundwater in the alluvial material might discharge into the lower aquifer confined in the unweathered volcanic material at depth, which is the source of potable water. The results demonstrate there is no hydrologic connection between the deep aquifer in the unweathered volcanic series and the groundwater body in the alluvium. Section 4.16.1 of the Draft EIS provides further detail.

**Potable Water:** Once fully operational at the committed herd size of 699 mature dairy cows, the dairy will utilize 30,000 gallons per day (gpd), which is 0.03 million gallons per day (MGD), of potable (drinking water quality) water from groundwater provided through an on-site well. The State of Hawai‘i Department of Health Milk Rules require that potable water be used for milk production, both in the milking parlor and for milking operations; another potable water use will be for livestock drinking water. Should HDF decide, in the future, to expand to the contemplated herd size of up to 2,000 mature dairy cows, potable water demand will increase to 84,800 gpd (0.085 MGD). These demands are a small fraction of the 3 MGD produced by the on-site, existing Māhāʻulepū 14 well during the sugarcane plantation era. All potable water used as wash water will be re-applied to pasture and thus remain a part of the evapotranspiration cycle. Long-term groundwater supply impacts are not anticipated to be significant.

The assessment concludes that the modest potable water demand from the dairy operation, and the 4,500-foot distance between the Māhāʻulepū 14 well and the County's Kōloa F well, will result in no adverse impacts to ongoing use of groundwater.
groundwater in the volcanic aquifer layer, which is the source of potable water. Groundwater in the alluvium will not impact the County drinking water well. Though the waterbody in which the County wells occur is confined and hydrologically separated from shallow groundwater in the Māhā‘ulepū Valley, HDF established a 1,000-foot setback surrounding the Kūloa Pk Well in agreement with the County Department of Water. Within this setback, no effluent will be applied and no animals will deposit manure as the area will not be used for grazing. Additional setbacks to protect water resources are included in the Surface Water section.

Groundwater Monitoring: Four groundwater monitoring wells were installed by HDF into the shallow groundwater within the alluvium to allow monitoring of water quality. Baseline data on water quality for both groundwater in the alluvium and groundwater in the deep aquifer were documented. Future monitoring will allow comparison between conditions prior to, and during, HDF operations. Results from the monitoring program will be shared with the Department of Health Clean Water Branch, dairy neighbors and the local Kaua‘i community.

Regional Water Demand: The adjacent, developed Kōloa-Po‘ipu region shows large and increasing demand for potable water for community and resort development. The State Department of Economic Development and Tourism (DBEDT) projects the population of Kaua‘i will increase county-wide by 17,300 residents by 2030. The South Kaua‘i population is estimated to reach 16,855 in 2035, when it is projected to encompass 19.2 percent of the County population. For the South Kaua‘i region (the Kōloa - Po‘ipu - Kaliiheo districts), water use in 2035 is projected to be 3.24 MGD, an increase of nearly 1 million gallons per day. An evaluation of the island’s infrastructure capacity for projected growth in population (both residents and visitors) through the year 2035 predicts the island will be facing a shortage of well water. Water resources must therefore be carefully managed to accommodate the projected growth and water demand anticipated in the region through 2035.

SURFACE WATER

The State Department of Land and Natural Resources Commission on Water Resource Management has established surface water hydrologic units for managing surface water resources. The project area is located within the Māhā‘ulepū Surface Water Hydrologic Unit, which features relatively high precipitation with relatively low stream discharge. There are no perennial streams in the Māhā‘ulepū watershed.

The HDF site is located on the bottom-land of the upper Māhā‘ulepū Valley, which is fed by several intermittent streams coming off of the south slope of the Ha‘upu Ridge. These normally dry streams converge into man-made channels running through the HDF site across the valley floor, and meet a concrete ditch that parallels lower Māhā‘ulepū Road. This ditch, named Waiopili Ditch, is joined by a reach from the west that originates at a small unnamed reservoir, and continues off site towards the south.

Potential Impacts from Construction: The dairy facility and associated infrastructure will be constructed in a 10-acre area located along the site’s western boundary. Built facilities within this area will total less than 2 percent of the HDF site. A Stormwater Pollution Prevention Plan (SWPPP) has been developed as part of the application for the National Pollutant Discharge Elimination System (NPDES) - Construction Stormwater General Permit. Management controls will include: minimizing exposure of disturbed surfaces; monitoring and repair of structural controls; and prohibiting leaking or poorly-maintained construction equipment and machinery. Structural controls to be utilized during construction will include: silt fence installed in key locations; sand bags barriers in swales; and geotextile filter fabric and sediment log around drain inlets.

Surface Water Quality: The Kaua‘i Chapter of the Surfrider Foundation began collecting water samples in Waiopili Ditch near the bridge accessing Makawehi Cave Reserve in April of 2014. The group reported high levels of enterococcus to the Clean Branch (CWB) quality assurance/quality control requirements, and it could not be used for regulatory purposes. CWB had not conducted water quality sampling for either nearshore recreation waters at the terminus of Waiopili Ditch, or of surface waters in the Māhā‘ulepū Surface Water Hydrologic Unit as the remote areas are on private lands.

Complaints from the public citing the high levels of enterococcus in Waiopili Ditch and concerns about the proposed dairy permitted CWB to conduct a “Sanitary Survey” of the Māhā‘ulepū and adjacent watersheds. DOH conducted water sampling within the Waiopili Ditch and areas upstream, and initiated a series of investigations into water quality issues. Following EPA standards for a Sanitary Survey, DOH has completed Part I of its report: Waiopili Ditch Sanitary Survey, Kauai, Part I. The Sanitary Survey found no significant impact to the ditch from any activity that could be attributed to the dairy. Feral animal waste, decaying organic debris and inputs from existing agricultural operations may all be contributing factors in the indicator bacteria levels found in ditches running through Māhā‘ulepū Valley. The survey also confirmed that the makai end of Waiopili ditch blocks ultraviolet rays, which could help reduce bacterial levels. CWB noted that Waiopili Ditch is a man-made drainage on private property, and is not an inviting recreational body of water utilized by people. The Sanitary Survey can be accessed on the DOH Clean Water Branch website under “Library” (http://health.hawaii.gov/cwb).

Long-term Operations, Setbacks and Buffers: Normal ongoing farming and ranching activities are exempt from the Clean Water Act Section 404. HDF received confirmation of exemption for maintenance of existing drainage ditches from the Honolulu District, U.S. Army Corps of Engineers (USACE) in 2013. Additional practices are anticipated to fall under the exemption for construction or maintenance of existing or new animal walkways, stream crossings, and farm roads in accordance with best management practices.

HDF operations will follow the practice standards of the National Resources Conservation Service (NRCS). These practices include setbacks to reduce runoff that could carry particles into surface waters. Fences will be erected 35-feet from the top of drainageway (totaling 70-feet in width) to keep cows away from surface waters. Vegetated buffers will be established between the fences and drainageways to
create filter strips that could capture particulates during stormwater runoff events.

Nutrients from Effluent Irrigation and Commercial Fertilizer Application: The natural fertilizer from manure deposited directly to pasture and effluent collected from the milking parlor is insufficient to meet the agronomic need of the pasture grass crop with the committed herd size of 699 mature dairy cows, and supplemental commercial fertilizer will be required. Nutrients required to sustain the 470 acres of pasture are the same for the future contemplated herd size of up to 2,000 mature dairy cows, though the proportion of nutrients supplied as natural fertilizer (manure and effluent) and commercial fertilizer changes. With the potential future contemplated herd size, supplemental nitrogen will be needed, and a small excess of phosphorus could occur. However, with an increase in dry matter (DM) yield (a measure of grass growth) of one ton per acre, phosphorous would be in a deficit and require commercial supplementation. Grass yields are anticipated to increase more than three tons DM per acre with dairy establishment, from the current 16.2 tons DM per acre to 20 tons DM per acre. Section 4.23 of the EIS provides additional information.

The groundwater and surface water analysis conducted for the Environmental Impact Statement estimated that surface water from Māhūʻulepū will carry three times more nutrients than groundwater, due to the poor permeability of the alluvium. Groundwater can discharge from the alluvium when it rises in wetter periods and intersects the deep drainage ditches. Such discharge to the channels could occur on an episodic, seasonal basis when rainfall exceeds 0.8 inches.

The groundwater engineer estimated potential nutrient pass-through to groundwater from the HDF nutrient budget at two percent of nitrogen (totaling 10,000 pounds per year), and one percent of phosphorus (totaling 900 pounds per year). Again, this nutrient run-off would not occur as chronic daily release, rather, the runoff contributions would be limited to periods of the major rainfall over 0.8 inches. Such rainfall events are estimated to occur approximately three percent of days, or an average of 10 days annually. Per best practices, no effluent application would be conducted during such weather events.

To provide perspective, nutrient inputs from the adjacent Kīlauea-Poʻipū region were also calculated. Nitrogen input to the marine environment in the Poʻipū region is calculated to be 38,510 pounds annually, or 3.5 times more than the estimate of potential nutrient throughput from HDF. Phosphorous for both domestic wastewater and landscape fertilization in the region is estimated to be 1,260 pounds annually, or 1.4 times greater than the potential discharge from HDF. The nutrient inputs from domestic uses in the Poʻipū region are constant throughout the year and no mitigation is applied to reduce the quantities.

Establishment of Water Quality Monitoring:

Waioipi Ditch provides the majority of freshwater input in the immediate coastal area. Water chemistry measurements made by MRCI identified mixing of ditch water occurs rapidly and within a short distance of the shoreline.

The minor contributions of nutrients from episodic rainfall anticipated to occur just 10 days annually from dairy operations will not adversely affect ocean water quality and the marine environment. The nearshore area is a highly mixed environment which actively disperses inputs within several meters from shore. Comparing nutrient constituents in surface water samples taken from the HDF site and the agricultural ditches down gradient to nutrients sampled in the nearshore ocean water revealed that indicator bacteria were substantially lower in the ocean than in the ditch. The rapid decrease is likely a result of both physical mixing of water masses and toxicity from saline water. In any event, the elevated levels of indicator bacteria do not extend beyond the shoreline. Baseline water quality data and the surface and marine water impact report is included in the Draft EIS as Appendix F.

AIR QUALITY: As a part of the Environmental Impact Statement (EIS), existing air quality conditions and project impacts were evaluated, including dust and odor. Potential odors and emission levels for air pollutants relevant to dairy operations were modeled, as currently there are no cows on site. EIS sections 4.19 and 4.25 provide an evaluation of air quality and odors, including a windrose depicting wind speed and direction in the area (see DEIS Section 4.1, Climate). The full air quality technical report can be found in Draft EIS Appendix I.

Clean Air Act

Under the Clean Air Act of 1970 (CAA), amended November 1990, the U.S. Environmental Protection Agency (EPA) regulates both large and small sources of air pollutants by establishing National Ambient Air Quality Standards (NAAQS) for six criteria pollutants. The State of Hawai‘i has established its own State Ambient Air Quality Standards (SAAQS) that are as strict or, in some cases more strict than the NAAQS. State standards prohibit any visible emissions of fugitive dust from construction activities at the property line.

Emissions relevant to livestock operation include particulate matter and fugitive dust. Greenhouse gases related to dairy cows include methane (CH4) from enteric fermentation, and both methane and nitrous oxide (N2O) emissions from manure application. No State or Federal regulations for greenhouse gas emissions from farm operations or small businesses currently exist.
DUST

Dust will be generated as cows move along soft limestone walkways that connect the paddocks and lead to and from the milking parlor. Potential fugitive dust emission rates were estimated from published literature, where particulate matter (PM) is measurable from the "drylots" of confined dairy operations where animals walk over dirt and dried manure throughout the day.

Applying the emission rates from this available literature greatly overestimates potential emission resulting from HDF. Cows in the pastoral rotational-grazing system will be on pasture 22 hours each day and will spend two hours – in two separate milking cycles – moving to and from the barn for the 10- to 15-minute milking sessions.

Using atmospheric dispersion modeling system (AERMOD), the rates were scaled to the size of the non-pasture areas used by cows at HDF. Results were added to the background concentration of particulate matter (both PM10 and PM2.5) measured on the island of Kaua‘i, and the total concentration was compared to the State ambient air quality standards. Only the contemplated herd size of up to 2,000 mature dairy cows was modeled, as at the lower threshold of 699 cows, the potential fugitive dust impact would be negligible. The estimated concentration for PM10 is 2.01 μg/m³, well below the State standard of 150 μg/m³. The estimated concentration for PM2.5 is 0.23 μg/m³, well below the Federal standard of 35 μg/m³ (see Draft EIS Section 4.19 and Table 4-19.2).

ODOR

Odor emissions are generated during incomplete anaerobic decomposition of organic matter in manure. No animals or dairy facilities currently exist in the area leased by HDF, so air dispersion models were used to determine potential odor levels. Local weather data was used in conjunction with the AERMOD modeling system, and published rates for manure odor emissions for dairy heifers and effluent ponds were adapted to reflect the HDF facilities.

Odor emission sources identified for modeling at HDF were manure in the pasture fields, irrigation water containing diluted nutrients from effluent, the effluent storage ponds, and the dairy buildings. Odor rates from published research were applied. Odor isopleths (a line used to map all points having the same numerical value) were created to display the model findings. Odor is described in "odor units" at the threshold of perception, which is defined by the point at which 50 percent of panelists, in laboratory conditions, cannot smell the odor but 50 percent of the panelists can detect the odor.

Modeling results were generated for worst case meteorological conditions (low wind velocity / mixing). Generally, tradewinds will disperse odors to less than detectable levels beyond the HDF site; in periods of no wind, odor may not be dispersed creating the "worst case" scenario. In these periods without normal tradewind flow, the odor plume would extend to the south of the HDF site. Sections 4.19.2 and 4.25.2 of the EIS include graphics of the potential odor isopleths.

Results for the committed herd size of 699 mature dairy cows show that odors may be detectable by 50 percent of the sensitive population once per 200 hours, or 44 hours per year, within an area that extends approximately 1,670-feet (within one-third of a mile) beyond the dairy farm boundary, and does not reach recreational or residential areas. Results for the contemplated expanded herd size of up to 2,000 mature dairy cows show odors would not extend beyond 2,780 feet outside the HDF boundary (just over half a mile), again not reaching recreational or residential areas, and again with detection limited to 50 percent of the sensitive population approximately 44 hours per year. The parameters used in the analysis were intentionally conservative, and the impacts shown assume an unlikely confluence of worst-case meteorological data, irrigation location, and grazing location. Actual offsite odor impacts are likely to be much lower and/or less frequent than shown; it is likely odor detection beyond the HDF boundaries will be less frequent.

This response letter accompanies your copy of the Draft Environmental Impact Statement (EIS). The Draft EIS is available on the OEQC website at the following URL: http://tinyurl.com/OEQCkAuAI

Thank you for your participation in the environmental review process.

Sincerely,

GROUP 70 INTERNATIONAL, INC.

Jeffrey H. Overton, AICP, LEED AP
Principal Planner

Thank you for your participation in the environmental review process.